ELECTRONICS

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SERVICE MANUAL

DVD-VR320A

DVD-VCR Recorder COMBO

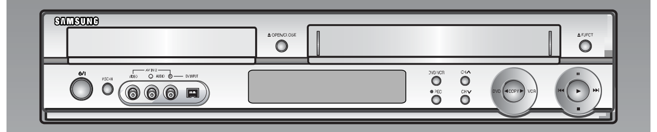
Chassis: K2
DVD-VR320/AXAA

SERVICE Manual

- The appearance of DVD-VR320 and appearance of DVD-VR320A is same.
  However AV CODEC IC is different from each other.
  DVD-VR320 use LSI Domino IC (DMN8602) as AV CODEC IC (Loacation is DIC1).
  DVD-VR320A use SAMSUNG IC (S5L3200) as AV CODEC IC (Loacation is DIC1).

- How to identify them by Label-Rating ; See next page.
  When servicing, be sure to confirm the model name on Label-Rating of Chassis-Rear.

DVD-VCR RECORDER COMBINATION



Merit & Character regarding Product

❶ Multi format recording
DVD-RAM/ DVD-RW/ DVD-R

❷ Multi format playback
DVD/ DVD-RAM/ DVD-RW/ DVD-R
CD/ CD-R/ CD-RW/ MP3/ JPEG

❸ Rcording mode
XP(1Hour)/ SP(2Hour)/ LP(4Hour)/ EP(6~8Hour)

❹ Progressive scan
Both DVD & VCR

❺ Automatic Chapter Product ON

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1. Precautions

1-1 Safety Precautions

1) Before returning an instrument to the customer, always make a safety check of the entire instrument, including, but not limited to, the following items:

(1) Be sure that no built-in protective devices are defective or have been defeated during servicing. (1)Protective shields are provided to protect both the technician and the customer. Correctly replace all missing protective shields, including any removed for servicing convenience.
(2)When reinstalling the chassis and/or other assembly in the cabinet, be sure to put back in place all protective devices, including, but not limited to, nonmetallic control knobs, insulating fish papers, adjustment and compartment covers/shields, and isolation resistor/capacitor networks. Do not operate this instrument or permit it to be operated without all protective devices correctly installed and functioning.

(2) Be sure that there are no cabinet openings through which adults or children might be able to insert their fingers and contact a hazardous voltage. Such openings include, but are not limited to, excessively wide cabinet ventilation slots, and an improperly fitted and/or incorrectly secured cabinet back cover.

(3) Leakage Current Hot Check-With the instrument completely reassembled, plug the AC line cord directly into a 120V AC outlet. (Do not use an isolation transformer during this test.) Use a leakage current tester or a metering system that complies with American National Standards institute (ANSI) C101.1 Leakage Current for Appliances and Underwriters Laboratories (UL) 1270 (40.7). With the instrument's AC switch first in the ON position and then in the OFF position, measure from a known earth ground (metal water pipe, conduit, etc.) to all exposed metal parts of the instrument (antennas, handle brackets, metal cabinets, screwheads, metallic overlays, control shafts, etc.), especially any exposed metal parts that offer an electrical return path to the chassis.
Any current measured must not exceed 0.5mA. Reverse the instrument power cord plug in the outlet and repeat the test. See Fig. 1-1.
Any measurements not within the limits specified herein indicate a potential shock hazard that must be eliminated before returning the instrument to the customer.

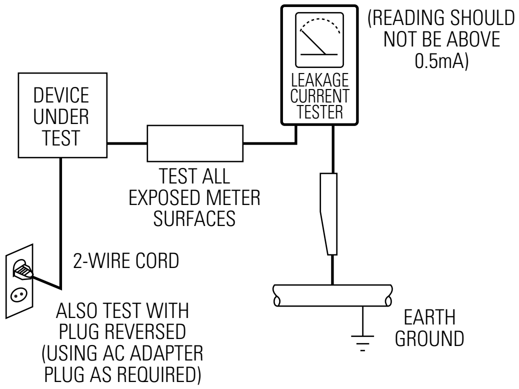

(READING SHOULD NOT BE ABOVE 0.5mA)
LEAKAGE CURRENT TESTER
DEVICE UNDER TEST
TEST ALL EXPOSED METER SURFACES
2-WIRE CORD
ALSO TEST WITH PLUG REVERSED (USING AC ADAPTER PLUG AS REQUIRED)
EARTH GROUND

Fig. 1-1 AC Leakage Test

(4) Insulation Resistance Test Cold Check-(1) Unplug the power supply cord and connect a jumper wire between the two prongs of the plug. (2) Turn on the power switch of the instrument. (3) Measure the resistance with an ohmmeter between the jumpered AC plug and all exposed metallic cabinet parts on the instrument, such as screwheads, antenna, control shafts, handle brackets, etc. When an exposed metallic part has a return path to the chassis, the reading should be between 1 and 5.2 megohm. When there is no return path to the chassis, the reading must be infinite. If the reading is not within the limits specified, there is the possibility of a shock hazard, and the instrument must be repaired and rechecked before it is returned to the customer. See Fig. 1-2.

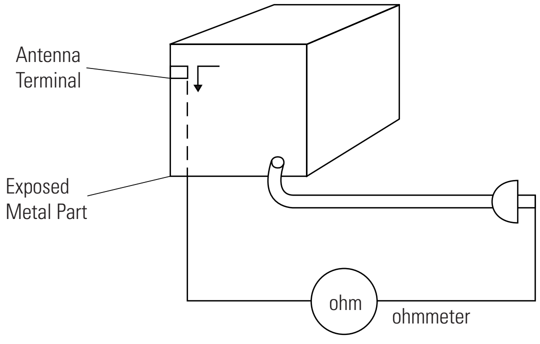


Fig. 1-2 Insulation Resistance Test

2) Read and comply with all caution and safety related notes on or inside the cabinet, or on the chassis.

3) Design Alteration Warning-Do not alter or add to the mechanical or electrical design of this instrument. Design alterations and additions, including but not limited to, circuit modifications and the addition of items such as auxiliary audio output connections, might alter the safety characteristics of this instrument and create a hazard to the user. Any design alterations or additions will make you, the servicer, responsible for personal injury or property damage resulting therefrom.

4) Observe original lead dress. Take extra care to assure correct lead dress in the following areas: (1) near sharp edges, (2) near thermally hot parts (be sure that leads and components do not touch thermally hot parts), (3) the AC supply, (4) high voltage, and (5) antenna wiring. Always inspect in all areas for pinched, out-of-place, or frayed wiring, Do not change spacing between a component and the printed-circuit board. Check the AC power cord for damage.

5) Components, parts, and/or wiring that appear to have overheated or that are otherwise damaged should be replaced with components, parts and/ or wiring that meet original specifications.
Additionally, determine the cause of overheating and/or damage and, if necessary, take corrective action to remove any potential safety hazard.

6) Product Safety Notice-Some electrical and mechanical parts have special safety-related characteristics which are often not evident from visual inspection, nor can the protection they give necessarily be obtained by replacing them with components rated for higher voltage, wattage, etc. Parts that have special safety characteristics are identified by shading, an (⚡)or a (⚠)on schematics and parts lists. Use of a substitute replacement that does not have the same safety characteristics as the recommended replacement part might create shock, fire and/or other hazards. Product safety is under review continuously and new instructions are issued whenever appropriate.

1-2 Servicing Precautions

CAUTION : Before servicing units covered by this service manual and its supplements, read and follow the Safety Precautions section of this manual.

Note : If unforseen circumstances create conflict between the following servicing precautions and any of the safety precautions, always follow the safety precautions. Remember: Safety First.

1-2-1 General Servicing Precautions

(1) a. Always unplug the instrument's AC power cord from the AC power source before (1) re-moving or reinstalling any component, circuit board, module or any other instrument assembly, (2) disconnecting any instrument electrical plug or other electrical connection, (3) connecting a test substitute in parallel with an electrolytic capacitor in the instrument.

b. Do not defeat any plug/socket B+ voltage interlocks with which instruments covered by this service manual might be equipped.

c. Do not apply AC power to this instrument and /or any of its electrical assemblies unless all solid-state device heat sinks are correctly installed.

d. Always connect a test instrument's ground lead to the instrument chassis ground before connecting the test instrument positive lead. Always remove the test instrument ground lead last.

Note : Refer to the Safety Precautions section ground lead last.

(2) The service precautions are indicated or printed on the cabinet, chassis or components. When servicing, follow the printed or indicated service precautions and service materials.

(3) The components used in the unit have a specified flame resistance and dielectric strength.
When replacing components, use components which have the same ratings. Components identified by shading, by(⚡) or by (⚠) in the circuit diagram are important for safety or for the characteristics of the unit. Always replace them with the exact replacement components.

(4) An insulation tube or tape is sometimes used and some components are raised above the printed wiring board for safety. The internal wiring is sometimes clamped to prevent contact with heating components. Install such elements as they were.

(5) After servicing, always check that the removed screws, components, and wiring have been installed correctly and that the portion around the serviced part has not been damaged and so on. Further, check the insulation between the blades of the attachment plug and accessible conductive parts.

1-2-2 Insulation Checking Procedure

Disconnect the attachment plug from the AC outlet and turn the power ON. Connect the insulation resistance meter (500V) to the blades of the attachment plug. The insulation resistance between each blade of the attachment plug and accessible conductive parts(see note) should be more than 1 Megohm.

Note : Accessible conductive parts include metal panels, input terminals, earphone jacks, etc.

1-3 ESD Precautions

Electrostatically Sensitive Devices (ESD)

Some semiconductor (solid state) devices can be damaged easily by static electricity.
Such components commonly are called Electrostatically Sensitive Devices(ESD). Examples of typical ESD devices are integrated circuits and some field-effect transistors and semiconductor chip components. The following techniques should be used to help reduce the incidence of component damage caused by static electricity.

(1) Immediately before handling any semiconductor component or semiconductor-equipped assembly, drain off any electrostatic charge on your body by touching a known earth ground. Alternatively, obtain and wear a commercially available discharging wrist strap device, which should be removed for potential shock reasons prior to applying power to the unit under test.

(2) After removing an electrical assembly equipped with ESD devices, place the assembly on a conductive surface such as aluminum foil, to prevent electrostatic charge buildup or exposure of the assembly.

(3) Use only a grounded-tip soldering iron to solder or unsolder ESD devices.

(4) Use only an anti-static solder removal devices. Some solder removal devices not classified as “anti-static” can generate electrical charges sufficient to damage ESD devices.

(5) Do not use freon-propelled chemicals. These can generate electrical charges sufficient to damage ESD devices.

(6) Do not remove a replacement ESD device from its protective package until immediately before your are ready to install it.(Most replacement ESD devices are packaged with leads electrically shorted together by conductive foam, aluminum foil or comparable conductive materials).

(7) Immediately before removing the protective materials from the leads of a replacement ESD device, touch the protective material to the chassis or circuit assembly into which the device will be installed.

CAUTION : Be sure no power is applied to the chassis or circuit, and observe all other safety precautions.

(8) Minimize bodily motions when handling unpackaged replacement ESD devices. (Otherwise harmless motion such as the brushing together of your clothes fabric or the lifting of your foot from a carpeted floor can generate static electricity sufficient to damage an ESD device).

1-4 Handling the optical pick-up

The laser diode in the optical pick up may suffer electrostatic breakdown because of potential static electricity from clothing and your body.

The following method is recommended.
(1) Place a conductive sheet on the work bench (The black sheet used for wrapping repair parts.)

(2) Place the set on the conductive sheet so that the chassis is grounded to the sheet.

(3) Place your hands on the conductive sheet(This gives them the same ground as the sheet.)

(4) Remove the optical pick up block

(5) Perform work on top of the conductive sheet. Be careful not to let your clothes or any other static sources to touch the unit.

◆ Be sure to put on a wrist strap grounded to the sheet.
◆ Be sure to lay a conductive sheet made of copper etc. Which is grounded to the table.

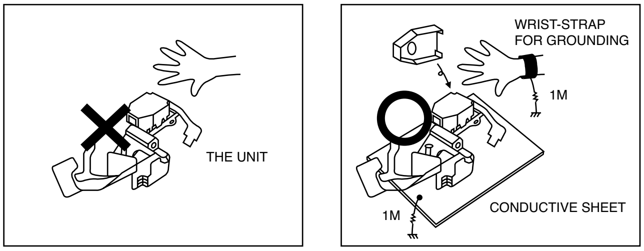


Fig.1-3

(6) Short the short terminal on the PCB, which is inside the Pick-Up ASS'Y, before replacing the Pick-Up. (The short terminal is shorted when the Pick-Up Ass'y is being lifted or moved.)

(7) After replacing the Pick-up, open the short terminal on the PCB.

MEMO

2. Product Specification

2-1 Product Specification

General	Power requirements	120V AC,60Hz
	Power consumption	45Watts
	Weight	9.03 IB
	Dimensions	16.9in(W) x 10.6in(D) x 3.1in(H)
	Operating temp	+41°F to 95°F
	Other conditions	Keep level when operating. Less than 75% operating humidity
Input	Video	1.0 V p-p at 75ohm load, sync negative
		S-Video input (Y:1.0Vp-p, C: 0.286Vp-p at 75ohm load)
	Max. Audio input level	2Vrms
	DV Input	IEEE 1394(4p) compatible jack
	Receivable Channels	Regular TV broadcasting : VHF (2~13), UHF (14~69)
		Cable TV broadcasting: 1~125
Output	Audio	Audio output jacks 1,2
		Optical/coaxial digital audio output support
		Min. 100dB signal-to-noise ratio
		Max. 0.005% total harmonic distortion(T. H. D) at average 1KHz
	Video	Video output jacks 1,
		S-Video output 1 (Y: 1.0Vp-p, C:0.286Vp-p at 75 ohm load)
		Component output (Y: 1.0Vp-p ,Pb:0.70Vp-p, Pr:0.70Vp-p at 75ohm load)
DVD	Picture compression format	MPEG-II
	Audio compression format	Dolby digital 2ch/256kbps
	Recording Qallity	XP(about 8Mbps), SP(about 4Mbps), LP(about 2Mbps), EP(about 1.2Mbps)
	Video S/N Ratio	Min. 50dB at standard recording
	Audio S/N Ratio	MIN. 75dB
	Audio frequency characteristics	20Hz ~ 20KHz

2-2 Chassis Product Specification

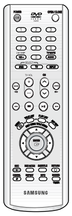
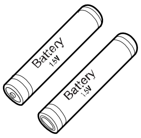
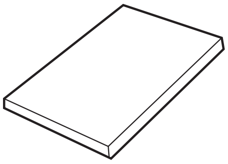
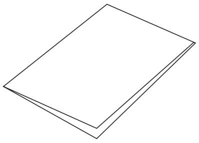
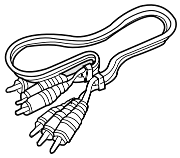
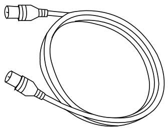
	Model Name (Buyer Model Name)	DVD-VR300	DVD-VR320A
General	Export Country	USA	USA
	Buyer Name	SEA	SEA
	Instruction Manual (Language)	Eng	Eng
	OSD/OSP - Language (RED ; Initial)	Eng / Fre / Spa	Eng / Fre / Spa
	Front Panel Tool Name	04-SECREC430A	05-SECREC430B
	Body Color	SILVER	SILVER
	Applied Regulation	UL / FCC	UL / FCC
SYSTEM	GENERAL SYSTEM		
	PAL REC/PB	N	N
	SECAM REC/PB	No / No	No / No
	MESECAM REC/PB	No / No	No / No
	NTSC3.58 REC/PB	Yes / Yes	Yes / Yes
	NTSC4.43 REC/PB	No / No	No / No
	NTSC Playback on PAL TV	No	No
	FEATURES		
	One Touch Timer	Yes	Yes
	Copy	Bi-directional	Bi-directional
	Control OSD Menu (UI)	Yes	Yes
	On Screen Help Message (UI)	Yes	Yes
	Quick Set Up	Yes	Yes
	Back Ground Graphic	Yes (Black)	Yes (Black)
	SA Programming	X	X
	Satellite Receiver Control/CBC	X	X
	CA/MA	X	X
	GO-PORT	X	X
	TV View	X	X
	Syncro Rec	X	X
	Audio Dubbing	X	X
	Canal + Compatible	X	X
	DESIGN		
	Front Panel Tool Name	04-SECREC430A	05-SECREC430B
	Key Function	Power , Progressive , Open/Close Ch Up / Down , Time Slip , STOP DVD/VCR , REC , PB , REW , FF Copy(DVD) , Copy(VCR) , EJECT	Power , Progressive , Open/Close Ch Up / Down , STOP, P/STILL, DVD/VCR , REC , PB , REW , FF Copy(DVD) , Copy(VCR) , EJECT
	Body Color	SILVER	SILVER
	Half Mirror	Yes	Yes
	Hot stamping	No	No
	Window Material	ACRYL	ACRYL
	Display of Panel Front	LED Module	LED Module
	EZ View Key on Front	X	X
	P480 Key on Front	O	O
	Power Knob LED	X	X
	Indicator LED	Copy (DVD , VCR)	X
	REMOTE		
	Tool Name	6th 53-key(VR6353)	6th 53-key(VR6353)
	JOG & Shuttle	X	X
	Glow-in-the-dark	X	X
	Color	Silver	Silver
	Battery Type	AAAx2EA	AAAx2EA
	Language	Eng	Eng
	10key (for Ch Select)	Yes	Yes
	Multi-Brand TV Control	Yes	Yes
	TERMINALS (IN / OUT)		
	Video/Audio In RCA Jack (on the Front)	Yes (LINE 2) x1	Yes (LINE 2) x1
	S-Video Input (on the Rear)	Yes(1)	Yes(1)
	DV Input (on the Front)	Yes x1	Yes x1
	HDMI Output (on the Rear)	X	X
	Video/Audio In RCA Jack (on the Rear)	Yes (LINE 1) x1	Yes (LINE 1) x1
	Video/Audio Out RCA Jack (on the Rear)	Yes (LINE OUT) x1	Yes (LINE OUT) x1
	Aerial In / RF-Out (on the Rear)	Yes /No	Yes /No
	Component Video Output (on the Rear)	Yes (1)	Yes (1)
	S-Video Output (on the rear)	Yes (1)	Yes (1)
	D Terminal (on the rear)	X	X
	ANYNET	X	X
	Additional Rear Audio Output for component/S-Video (on the Rear)	Yes (1)	Yes (1)
	Coaxial Digital Audio Output (on the Rear)	Yes (1)	Yes (1)
	Optical Digital Audio Output (on the Rear)	Yes (1)	Yes (1)
	5.1ch Audio Output	X	X
	6 in 2(MS,SMC,SD,MMC) Memory Slot	X	X
	Headphone Jack	X	X
	Video / Audio 21 Pin (on the Rear)	X	X
	Sat. 21 Pin (on the Rear) with LINE THROUGH(STB THROUGH)	X	X
	RGB Output 21 Pin (for DVD)	X	X
	Control-S In	X	X
	TUNER		
	Tuning System	FSS	FSS

	Model Name (Buyer Model Name)	DVD-VR300	DVD-VR320A
	Export Country	USA	USA
	Buyer Name	SEA	SEA
	INITIAL SET KEY(Easy Set Up)	Plug & Play(RF/Clock)	Plug & Play(RF/Clock)
	Broadcast System	NTSC-M	NTSC-M
	CH Coverage	VHF / UHF / CATV	VHF / UHF / CATV
	RF-out CH & System	3/4 VHF	3/4 VHF
	Default RF Channel	X	X
	RF-out channel Auto seeking -->all G&I version	X	X
	Stereo System	MTS / SAP	MTS / SAP
	Station Capacity (Number of Preset)	181CH	181CH
	Auto Channel Sort & Mapping(Intelligent Auto Set-up)	No	No
	TIMER RECORDING		
	No. of Events	12 Event / 1 Month	12 Event / 1 Month
	Backup Time	Permanent	Permanent
	Clock Type	Quartz	Quartz
	Auto Clock Set	Yes	Yes
	Just Clock	X	X
	Auto speed Timer Recording	Yes	Yes
	Easy Timer Programming (REC Dial Timer)	X	X
	EPG (Gemstar Function)	X	X
	VCR Plus	X	X
	VPS or PDC Function	X	X
	SWITCH		
	Jog/Shuttle Dial (on the Front Panel)	X	X
	TV/VCR select Button	X	X
	Audio Mute Button	X	X
	Mode / Speed Select Switch	Yes (on the remote control)	Yes (on the remote control)
VCR	Video System Select Switch	X	X
	Modulator System Select Switch	X	X
	GENERAL SYSTEM		
	Deck Type	X-11	X-11A
	Cylinder Type	4Head Hi-Fi (6ch)	4Head Hi-Fi (6ch)
	Narrow Head	Yes (19u)	Yes (19u)
	Tape Speed NTSC : REC, (PB)	SP / EP , (SP / LP / EP)	SP / EP , (SP / LP / EP)
	FEATURES		
	Index Function (Search & SCAN)	Yes	Yes
	REW Time	about 100sec(T120)	about 120sec(T120)
	Auto Head Cleaner	X	X
	16:9 (Wide Broadcast : TV through)	X	X
	Video Insert	X	X
	AV-Link (SmartLink)	X	X
	Digital Auto Tracking	Yes	Yes
	IPC (= Smart Trilogic)	X	X
	Picture Sharpness control (PSC)	X	X
	Auto Repeat Playback	Yes	Yes
	S-VHS (SQPB)	Yes	Yes
	Flying Erase Head	X	X
	Soft Cassette Door	X	X
	CODO	X	X
DVD	GENERAL SYSTEM		
	Deck Type	DP-R1(RAMBO-1)	DP-R2(RAMBO-2)
	Opt Type		
	Dynamic Tilt Compensation	X	X
	REC mode	XP / SP / LP / EP	XP / SP / LP / EP
	Recording Media DVD-RAM	O	O
	Recording Media DVD-RW	O	O
	Recording Media DVD-R	O	O
	Yes DVD	X	X
	Region Code	1	1
	Karaoke	X	X
	PAL Play	X	X
	NTSC3.58	Yes	Yes
	NTSC4.43	X	X
	NTSC Playback on PAL TV	X	X
	Playable Media		
	DVD-VIDEO	Yes	Yes
	CD	Yes	Yes
	VCD	X	X
	SVCD	X	X
	CVD	X	X
	MPEG-4 (Divx)	X	X
	DVD-R	Yes	Yes
	DVD-RW (Video Mode)	Yes	Yes
	DVD-RW (VR Mode)	Yes	Yes
	DVD+R	X	X
	DVD+RW	X	X

	Model Name (Buyer Model Name)	DVD-VR300	DVD-VR320A
	Export Country	USA	USA
	Buyer Name	SEA	SEA
	CD-R/RW	Yes	Yes
	MP3	Yes (500 folders)	Yes (500 folders)
	JPEG (CD-R/RW)	Yes	Yes
	PHOTO-CD (KODAK)	Yes	Yes
	Super Audio CD (HD Layer)	X	X
	Super Audio CD (CD Layer)	Yes	Yes
	Copy Controled CD	Yes	Yes
	DISC TEXT	X	X
	Memory Stick (ATRAC3)	X	X
	Memory Stick (JPEG)	X	X
	VIDEO		
	Video DAC	54MHz/10Bit	54MHz/10Bit
	Progressive (P480)	Yes	Yes
	Upscaling(720P/1080i)	X	X
	Block Noise Reduction	X	X
	Digital Video Enhancer	Yes (Embedded)	Yes (Embedded)
	Custom Picture Mode	X	X
	Video Equalizer	Yes (Embedded)	Yes (Embedded)
	AUDIO		
	Audio DAC	96kHz, 24 bit	96kHz, 24 bit
	DTS Digital Output	Yes	Yes
	Dolby Digital 5.1ch Decode	X	X
	DTS 5.1ch Decode	X	X
	Super Audio CD Multi ch Output	X	X
	Virtual Surround (2ch)	Yes	Yes
	V.C.Filter	X	X
	R-Core Transformer	X	X
	Audio Isolated Circuit Board	X	X
	Off Center Insulator	X	X
	Audio Isolated Circuit Board	X	X
	FEATURES		
	Start Up Screen	X	X
	Screen Saver	Yes	Yes
	Audio/Video Bit Rate Indicator	X	X
	Layer Indicator	X	X
	2x Audio during Scan Forward	X	X
	128x Search	Yes	Yes
	Instant Search	X	X
	Instant Replay	X	X
	Time Slip	O	X
	PIP	X	X
	Picture Navi	X	X
	Playback Memory	X	X
	Picture Memory		
	Bookmark	Yes (10 discs)	Yes (10 discs)
	Zoom	Yes (x2 , x4)	Yes (x2 , x4)
	Resume	Yes	Yes
	Custom Parental Control	Yes	Yes
	Child Lock	X	X
	WMA	X	X
	EZ View	X	X
	EZ Play	X	X
	My DVD	X	X
COMMON	Sound Feedback	X	X
	ACCESSORIES		
	Remote Controller	Yes	Yes
	Batteries	Yes	Yes
	Power Cord Type	EP-2 Polarity	EP-2 Polarity
	Plug Conversion	X	X
	Euro Scart Cable(21pin)	X	X
	RF Cable	Yes	Yes
	RCA Audio Cable	X	X
	RCA A/V Cable	Yes	Yes
	Instruction Manual	Yes	Yes
	Warranty Card	Yes(IB Included)	Yes(IB Included)
	REGISTRATION Card	Yes	Yes
	STOP RETURN SHEET	X	X
	Customer Reguest Card	X	X
	DISC	X	X
	CARTON BOX		
	Packing Box (White Carton)	Flexo	Flexo
	EPS-less Carton		
	Language	ENG	ENG
	DIMENSION ETC.		
	Dimension (W*H*D mm) <Net>	430x84x321	430x84x321

	Model Name (Buyer Model Name)	DVD-VR300	DVD-VR320A
	Export Country	USA	USA
	Buyer Name	SEA	SEA
	Dimension (W*H*D mm) <Gross>	514x180x426	514x180x426
	Weight (kg) <Net> / Weight (kg) <Gross>	4.7KG / 6.8KG	4.7KG / 6.8KG
	Power Consumption ON/STANDBY	45W	45W
	Power Requirement	~ 120V 60Hz	~ 120V 60Hz
	Container 20ft	792	765
	Container 40ft	1,623	1,623
	OTHERS		
	Country Origin (Body)		
	Country Origin (Carton)		
	Country Origin (Remote)		
	On Line Sticker		
	POP on TOP Cover		

2-3 Option Product Specification

Description Fig	Description	Parts No	Remark
	Remote Control	(AC59-00034H)	
	Batteries for Remote Control	(AC43-12002H)	
	User's Manual	(AK68-00588A)	
	Quick Guide	(AK68-00589A)	
	Video/Audio Cable	(AC39-00073A)	
	RF Cable	(AC39-42001J)	

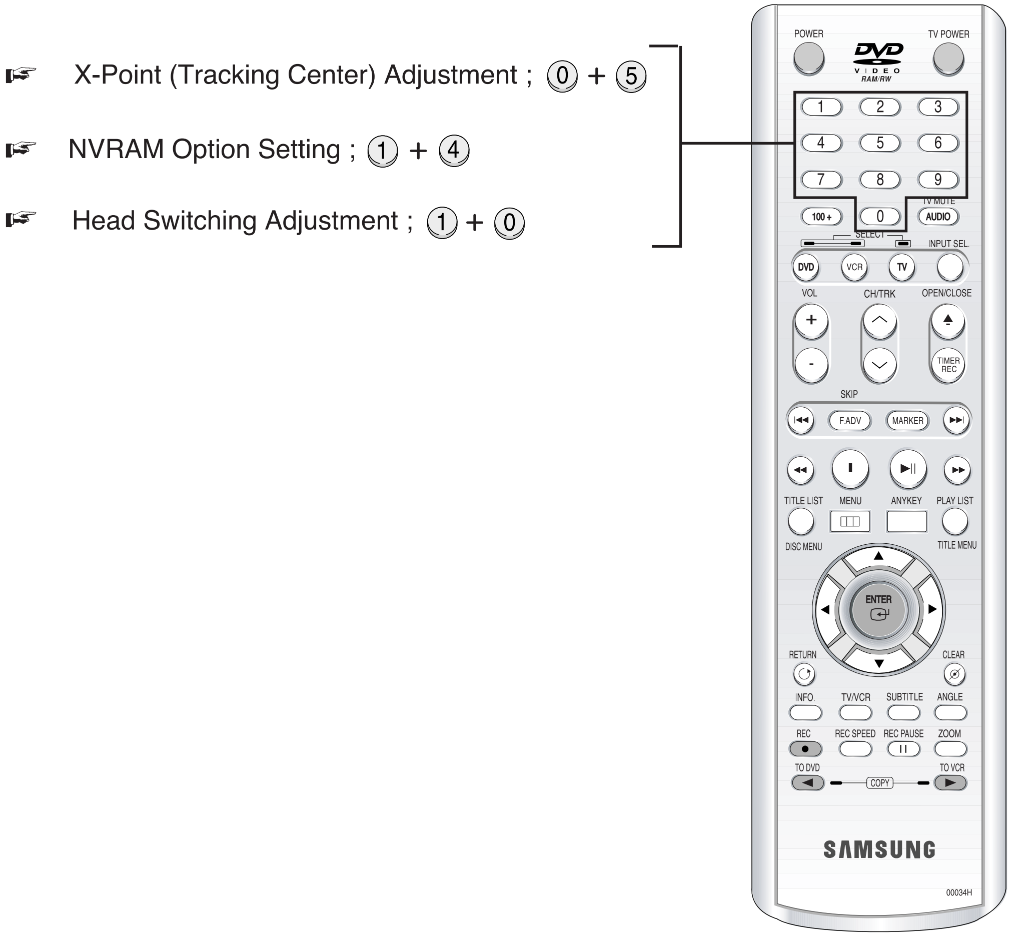
3. Alignment and Adjustments

3-1 VCR Adjustment

3-1-1 Reference

1) X-Point (Tracking center) adjustment, “Head switching adjustment” and “NVRAM option setting” can be adjusted with remote control.
2) When replacing the Main PCB Micom (IC601) and NVRAM (IC603 ; EEPROM) be sure to adjust the “Head switching adjustment” and “NVRAM option setting”.
3) When replacing the cylinder ass’y, be sure to adjust the “X-Point” and “Head switching adjustment”.
4) How to adjust.
   - Intermittently short-circuit the Test Point on VCR Main PCB with pincers to the adjustment mode.
   - If the corresponding adjustment button is pressed, the adjustment is performed automatically.
   - When the adjustment is completed, be sure to turn the power off.

3-1-1(a) Location of adjustment button of remote control



☞ X-Point (Tracking Center) Adjustment ; ⓪ + ⑤

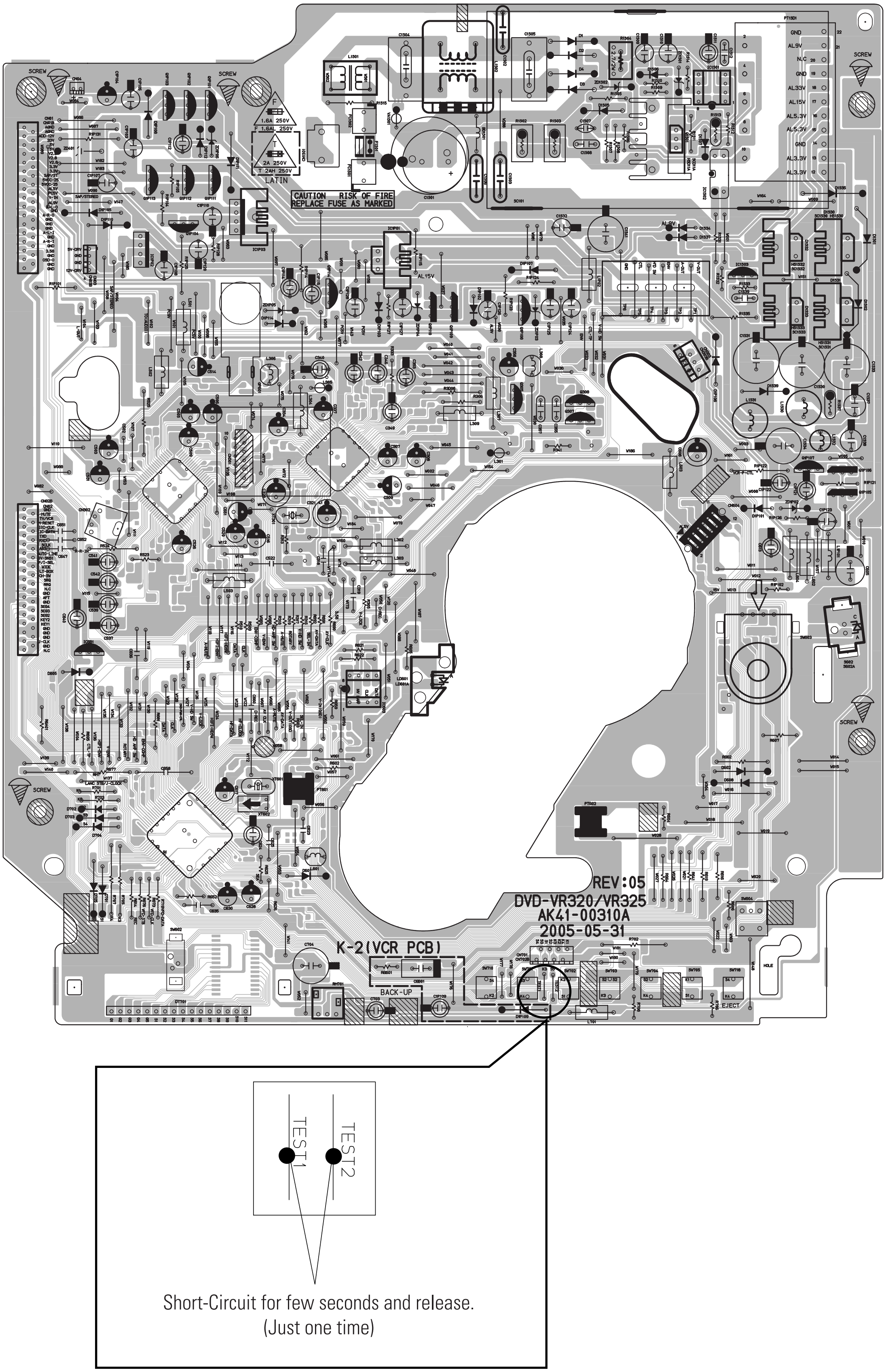
☞ NVRAM Option Setting ; ① + ④

☞ Head Switching Adjustment ; ① + ⓪

POWER
TV POWER
DVD VIDEO RAM/RW
1
2
3
4
5
6
7
8
9
100+
0
TV MUTE
AUDIO
SELECT
INPUT SEL.
DVD
VCR
TV
VOL
CH/TRK
OPEN/CLOSE
TIMER REC
SKIP
F.ADV
MARKER
TITLE LIST
MENU
ANYKEY
PLAY LIST
DISC MENU
TITLE MENU
ENTER
RETURN
CLEAR
INFO.
TV/VCR
SUBTITLE
ANGLE
REC
REC SPEED
REC PAUSE
ZOOM
TO DVD
TO VCR
COPY
SAMSUNG
00034H

Fig. 3-1

3-1-1(b) TEST location for adjustment mode setting


REV:05
DVD-VR320/VR325
AK41-00310A
2005-05-31
K-2(VCR PCB)
BACK-UP
EJECT
TEST1
TEST2

Short-Circuit for few seconds and release.
(Just one time)

Fig. 3-2 VCR Main PCB (Top View)

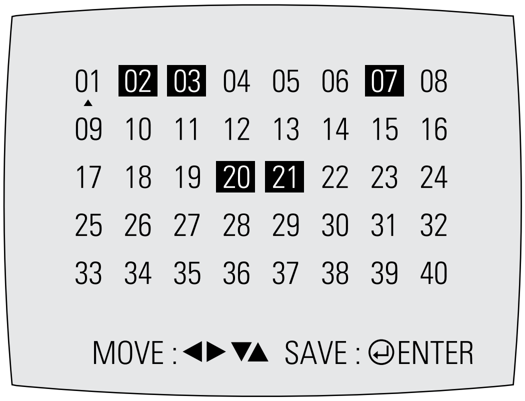
3-1-2 Head Switching Point Adjustment

1) Playback the alignment tape.
2) Intermittently short-circuit the two Test Points on VCR Main PCB while setting the adjustment mode. (See Fig. 3-2)
3) Press the "1, 0" buttons; remote control adjustment operates automatically. (See Fig. 3-1)

3-1-3 NVRAM Option Setting

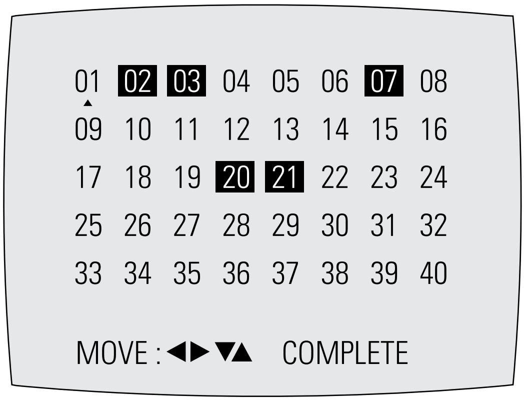
1) NVRAM Option is adjusted in the factory.
2) In case VCR Main PCB Micom (IC601) and NVRAM (IC603 ; EEPROM) are replaced, be sure to set the corresponding option number of the required model. (If the option is not set, the unit will not operate.)

1) Intermittently short-circuit the two Test Points on VCR Main PCB. (See Fig. 3-2)
2) Press the "1, 4" button on the remote control. The option setting appears. (See Fig. 3-3)
3) Select the option number (See table 3-1) of corresponding model with "◀, ▶, ▲ ,▼" buttons on the remote control.
4) After selecting the option number is completed, press the " ▲" button of remote control. (If " ▲" button is pressed, the selected number is changescolor. ; See Fig. 3-4)
5) Press the "ENTER" button of remote control again to store the option number.
6) Turn the Power off.



01 02 03 04 05 06 07 08
09 10 11 12 13 14 15 16
17 18 19 20 21 22 23 24
25 26 27 28 29 30 31 32
33 34 35 36 37 38 39 40

Fig. 3-3



01 02 03 04 05 06 07 08
09 10 11 12 13 14 15 16
17 18 19 20 21 22 23 24
25 26 27 28 29 30 31 32
33 34 35 36 37 38 39 40

Fig. 3-4

<Table 3-1 NVRAM Option Table>

MODEL	OPTION NUMBERS
DVD-VR320/AXAA	2, 3, 5, 7, 20, 21, 25, 26, 31

3-2 VCR Mechanical Adjustment

3-2-1 Tape Transport System and Adjustment Locations

The tape transport system has been adjusted precisely in the factory. Alignment is not necessary except for the following :
1) Noise observed on the screen.
2) Tape damage.
3) Parts replacement in the tape transport system.

Lower flange height of tape guide is used as the reference for the transport adjustment.
To maintain the height of the tape guide and prevent damage, do not apply excessive force onto the main base.

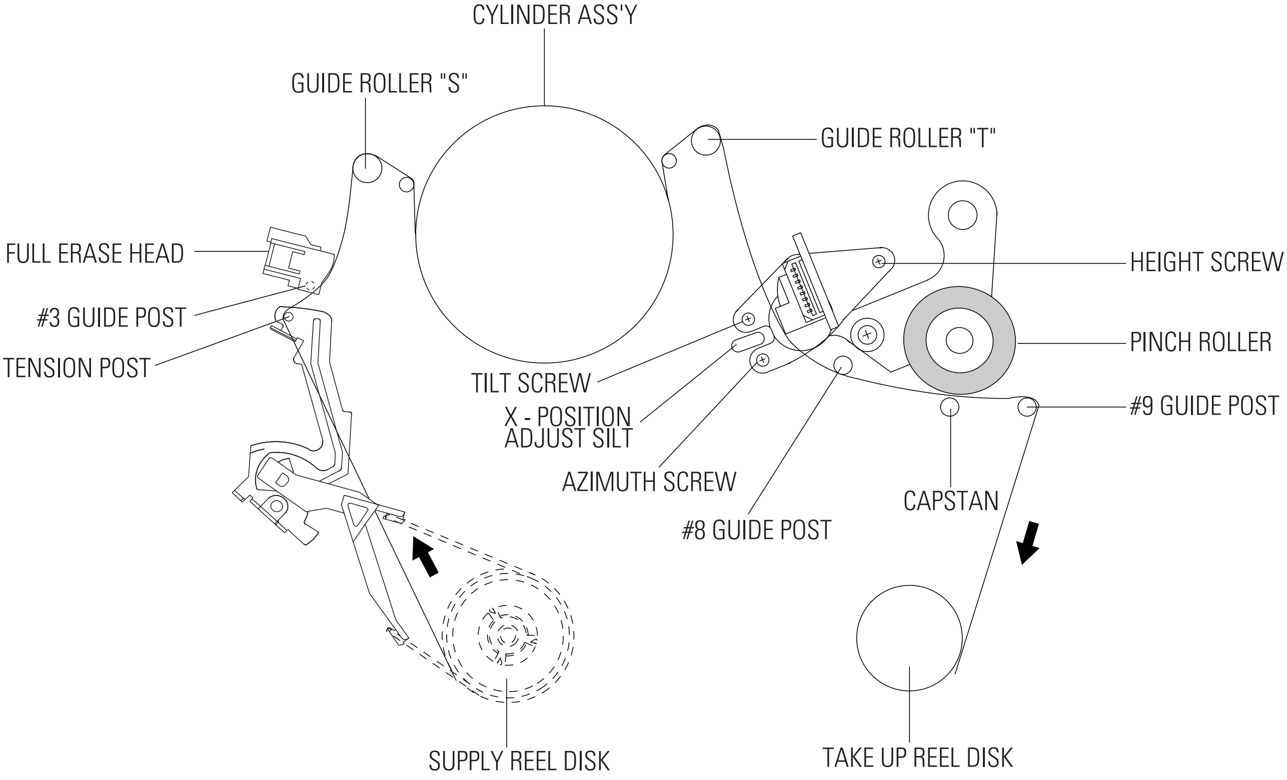

CYLINDER ASS'Y
GUIDE ROLLER "S"
GUIDE ROLLER "T"
FULL ERASE HEAD
HEIGHT SCREW
#3 GUIDE POST
PINCH ROLLER
TENSION POST
TILT SCREW
X - POSITION ADJUST SILT
#9 GUIDE POST
AZIMUTH SCREW
CAPSTAN
#8 GUIDE POST
SUPPLY REEL DISK
TAKE UP REEL DISK

Fig. 3-5 Location of Tape Transport Adjustment

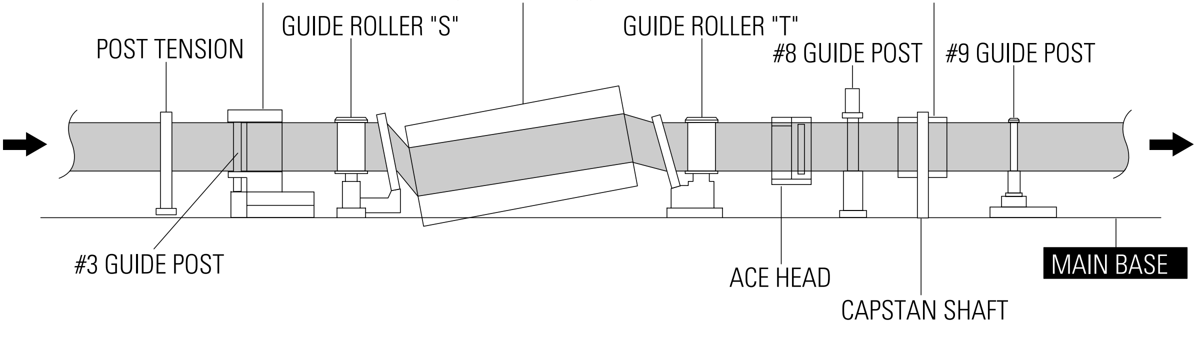

FE HEAD
CYLINDER ASS'Y
PINCH ROLLER
GUIDE ROLLER "S"
GUIDE ROLLER "T"
POST TENSION
#8 GUIDE POST
#9 GUIDE POST
#3 GUIDE POST
ACE HEAD
MAIN BASE
CAPSTAN SHAFT

Fig. 3-6 Tape Travel Diagram

3-2-2 Tape Transport System Adjustment

When parts are replaced, perform the required adjustments by referring to procedures for the tape transport system. If there are any changes to the tape path, first run a T-120 tape and make sure excessive tape wrinkle does not occur at the tape guides.

- ◆ If tape wrinkle is observed at the guide roller S, T, turn the guide roller S, T until wrinkle disappears.
- ◆ If the tape wrinkle is still observed at the tape guide, perform the tilt adjustment of the ACE head.

(1) ACE Head Assembly Adjustment

a. ACE HEAD HEIGHT ADJUSTMENT

1) Run the alignment tape (Color bar) in the playback mode.
2) Observe surface of the audio head using a dental mirror.
3) Turn screw (C) clockwise or counterclockwise until the gap of lower tape edge and the lower edge of the control head is about 0.25mm. (Refer to Fig. 3-7 and 3-8)

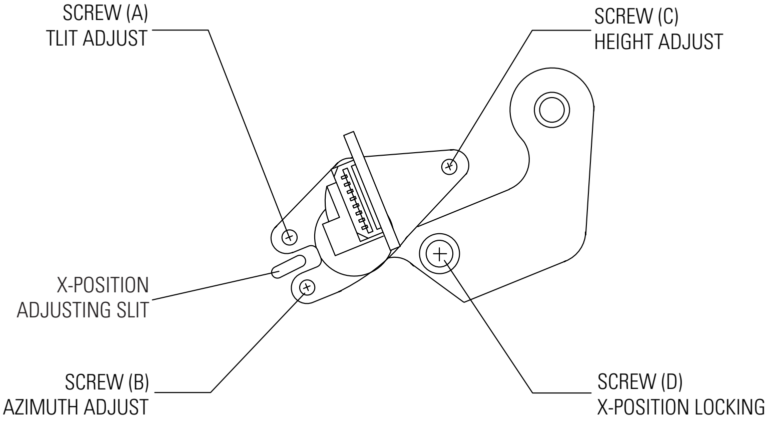

SCREW (A)
TLIT ADJUST
SCREW (C)
HEIGHT ADJUST
X-POSITION
ADJUSTING SLIT
SCREW (B)
AZIMUTH ADJUST
SCREW (D)
X-POSITION LOCKING

Fig. 3-7 Location of ACE Head Adjustment Screw

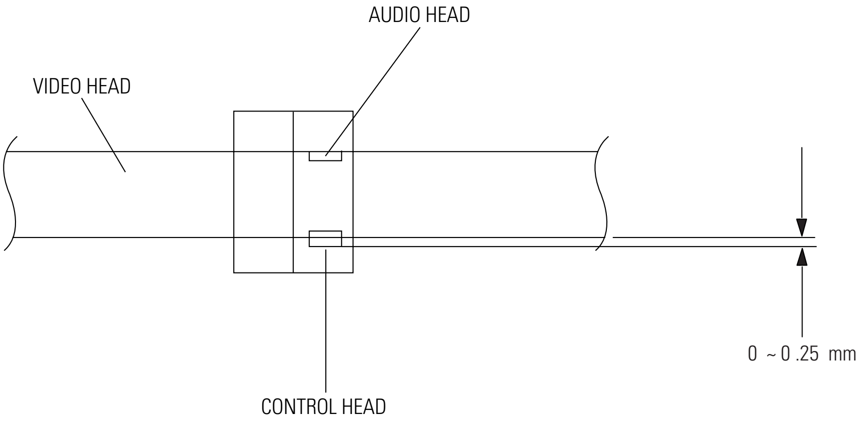

AUDIO HEAD
VIDEO HEAD
0 ~ 0 .25 mm
CONTROL HEAD

Fig. 3-8 ACE Head Height Adjustment

b. ACE HEAD TILT ADJUSTMENT

1) Playback a blank tape and observe the position of the tape at the lower flange of tape guide.
2) Confirm that there is no curl or wrinkle at the lower flange of tape guide as shown in Fig. 3-9 (B).
3) If a curl or wrinkle of the tape occurs, slightly turn the screw (A) tilt adjust on the ACE head ass'y.
4) Reconfirm the ACE head height.

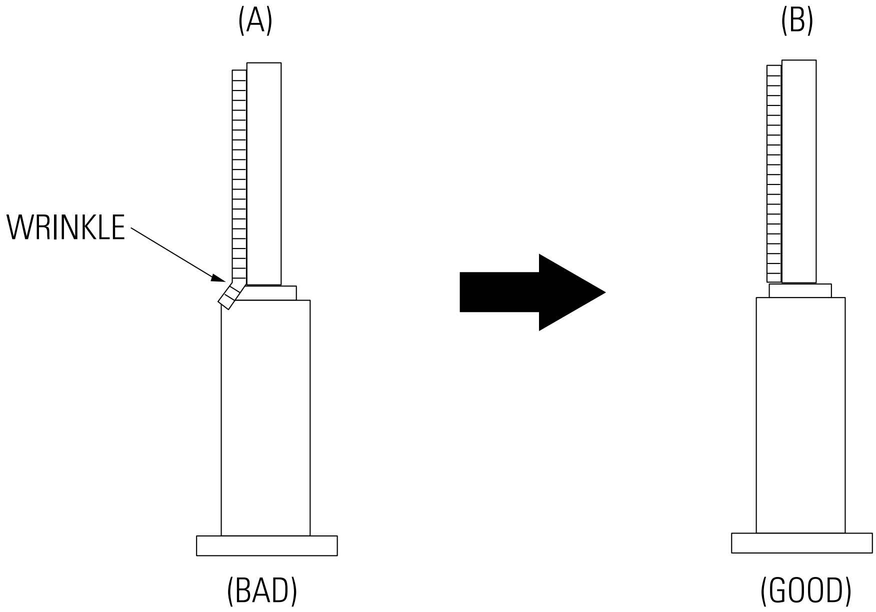


Fig. 3-9 Tape Guide Check

c. AUDIO AZIMUTH ADJUSTMENT

1) Load alignment tape (Mono scope) and playback the 7KHz signal.
2) Connect channel-1 scope probe to audio output.
3) Adjust screw (B) to achieve maximum audio level. (See Fig. 3-7)

d. ACE HEAD POSITION (X-POINT) ADJUSTMENT

1) Playback the alignment tape (Color bar)
2) Intermittently short-circuit the two Test Points on VCR Main PCB. (See Fig. 3-2)
3) Press the “0, 5” remote control buttons, then adjustment is operates automatically. (See Fig. 3-1)
4) Connect the CH-1 probe to “Envelope” the CH-2 probe to “H’D switching pulse” and then trigger to CH-1.
5) Insert the (-) driver into the X-Point adjustment hole and adjust it so that envelope waveform is maximum.

Test point : TP2 (Audio Output)
TP3 (Envelope)
TP4 (H’D S/W -Trigger)
TP5 (Control Pulse)

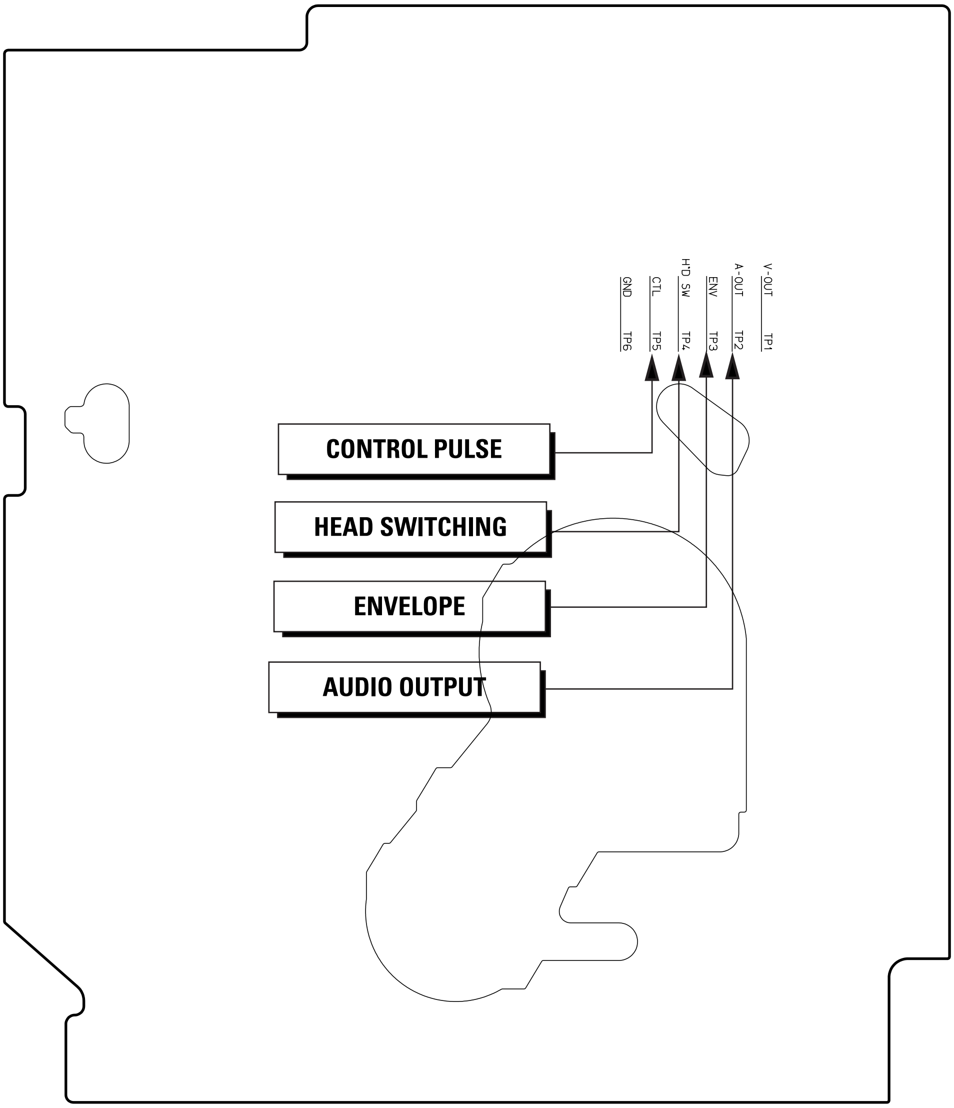

V-OUT TP1
A-OUT TP2
ENV TP3
H’D SW TP4
CTL TP5
GND TP6
CONTROL PULSE
HEAD SWITCHING
ENVELOPE
AUDIO OUTPUT

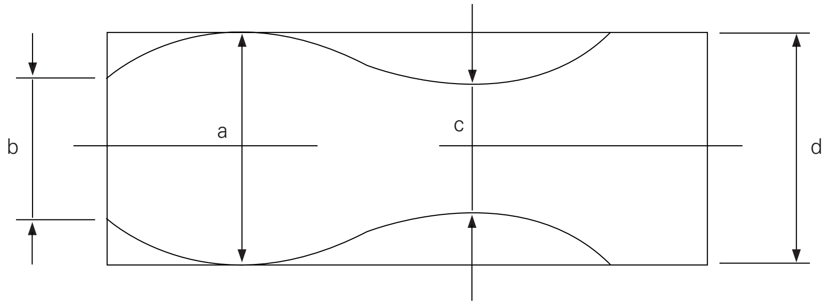
Fig. 3-10 Location of Test point (VCR Main PCB-Top View)

(2) Linearity adjustment (Guide roller S, T adjustment)

1) Playback the Mono Scope alignment tape (SP mode).
2) Observe the video envelope signal on an oscilloscope (triggered by the video switching pulse).
3) Make sure the video envelope waveform (at its minimum) meets the specification shown in Fig. 3-11.
If it does not, adjust as follows :

Note :
a=Maximum output of the video RF envelope.
b=Minimum output of the video RF envelope at the entrance side.
c=Minimum output of the video RF envelope at the center point.
d=Maximum output of the video RF envelope at the exit side.

4) If the section A in Fig. 3-12 does not meet the specification, adjust the guide roller S up or down.
5) If the section B in Fig. 3-12 does not meet the specification, adjust the guide roller T up or down.



a b c d

c,b,d/a ≧ 63%

Fig. 3-11 Envelope Waveform Adjustment

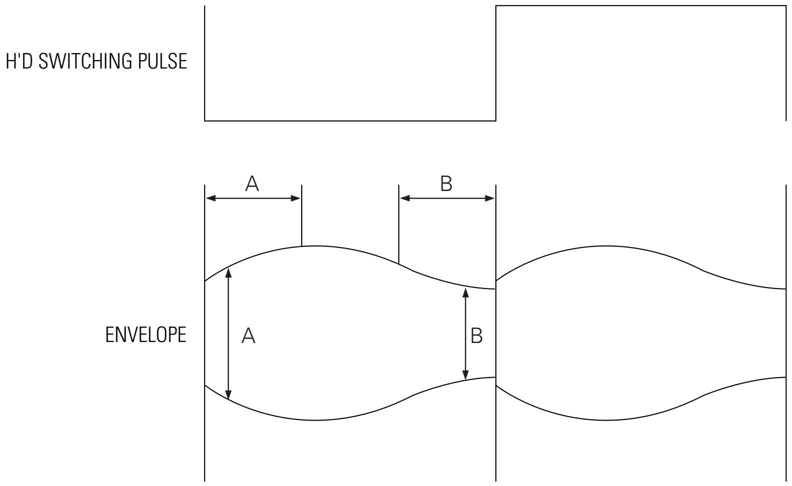


Fig. 3-12 Adjustment Points

6) Play back the Mono Scope alignment tape (SP mode).
7) Connect an oscilloscope CH-1 to the “Envelope” and CH-2 to the “H’D SW Pulse” for triggering.
8) Turn the guide roller heads with a flat head (▬) driver to obtain a flat video RF envelope as shown in Fig. 3-13.

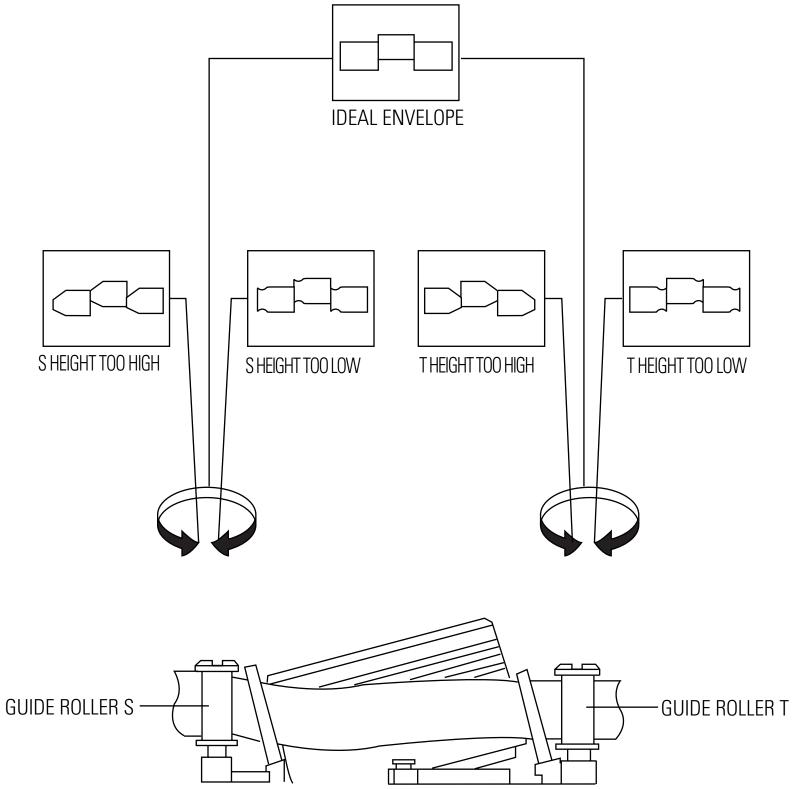

IDEAL ENVELOPE
S HEIGHT TOO HIGH
S HEIGHT TOO LOW
T HEIGHT TOO HIGH
T HEIGHT TOO LOW
GUIDE ROLLER S
GUIDE ROLLER T

Fig. 3-13 Guide Roller S, T Height Adjustment

(3) Check Transitional Operation from RPS to Play

Check transition from RPS mode to play mode : Using a pre-recorded SP tape, make sure the entry side of envelope comes to an appropriate steady state within 3 seconds (as shown in Fig. 3-14).
If the envelope waveform does not reach specified peak-to peak amplitude within 3 seconds, adjust as follows :

1) Make sure there is no gap between the supply roller lower flange and the tape.
   If there is a gap, adjust the supply guide roller again.
2) Change operation mode from the RPS to the play mode (again) and make sure the entry side of envelope rises within 3 seconds.

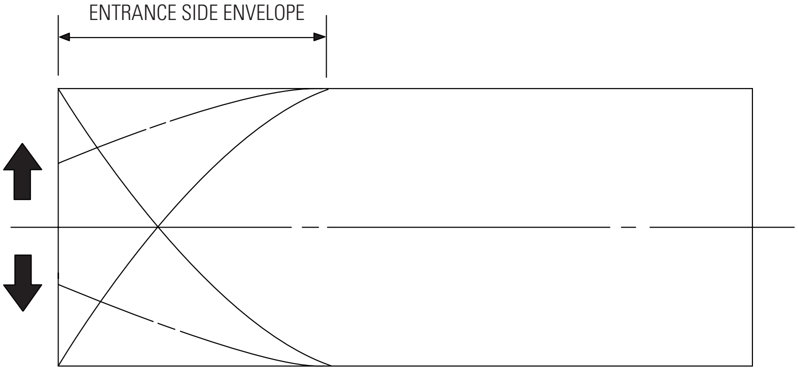


Fig. 3-14 Video Envelope Rising when Operation mode Changes from RPS to Play Mode

(4) Envelope Check

1) Make recordings on T-120 (E-120) and T-160 (E-180) tape.
   Make sure the playback output envelope meets the specification as shown in Fig. 3-15.
2) Play back a self recorded tape (recording made on the unit using with T-120 (E-120).
   The video envelope should meet the specification as shown in Fig. 3-15.
   In SP mode, (A) should equal (B).
   If the head gap is wide, upper cylinder should be checked.

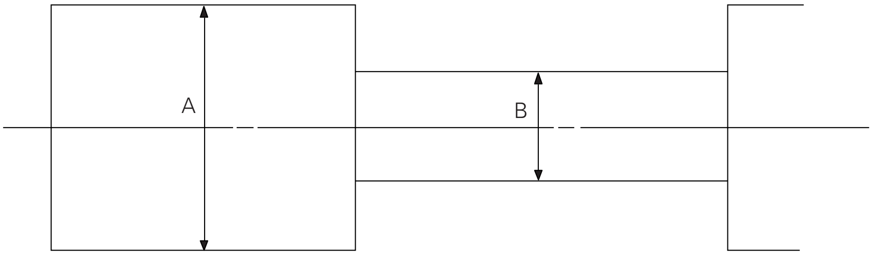


Fig. 3-15 Envelope Input and Output Level

(5) Tape Wrinkle Check

1) Run the T-160 (E-180) tape in the playback, FPS, RPS and Pause modes and observe tape wrinkle at each guide.
2) If excessive tape wrinkle is observed, perform the following adjustments in Playback mode :

◆ Tape wrinkle at the guide roller S, T section : Linearity adjustment.

◆ Tape wrinkle at tape guide flange : ACE head assembly coarse adjustment.

3-2-3 Reel Torque

1) The rotation of the capstan motor causes the holder clutch ass'y to rotate through the belt pulley.
2) The spring wrap PLAY/REV of holder clutch ass'y drives the disk reel S, T through gear idler by rotation of gear center ass'y.
3) Brake is operated by slider cam at FF/REW mode.
4) Transportation of accurate driving force is done by gears. (Gear Center Ass'y)

Note : If the spec. does not meet the followings specifications, replace the holder clutch ass'y and then recheck.

<Table 3-2>

MODE	TORQUE g/cm	GAUGE
PB	42 ± 11	Cassette Torquemeter
RPS	145 ± 30	Cassette Torquemeter

MEMO

4. Software Update

4-1 Drive Firmware Update

4-1-1 Introduction

Samsung will often support software update to improve the performance of DVD Recorder&VCR to the latest staus, through Samsung Internet Site. (www. samsung.com)

4-1-2 How to make an update disc

- **Write the downloaded file onto a blank CD-R or CD-RW disc, using the following settings :**

1) You have to download a newl file through Samsung Internet site. (www.samsung.com)
2) Write the file to disc using the CD-RW of your computer.

NOTE

- Recommended Application Program
  - Nero Burning / Easy CD Creator ..etc
- Option
  - Name : SDM2224
  - Extension name : “*.REC”
  - Multisession : No Multisession
  - File name lenght : Max. of 11 = 8 + 3
  - Format : Mode 1
  - Character set : ISO 9660 or Joliet Format
  - CD Close & Dise at once
  - Label : RAMBO

WARNING

It is very important : please read the below notice below before upditang your unit.
The followong events may interrupt the update process and MAY RESULT IN PERMANENT DAMAGE TO THE UNIT WHILE UPDATING

① Unplugging the power cord.
② Power Outage.
③ Dirt or Scratches on the disc.
④ Opening a disc tray during processing.

1) Press **OPEN/CLOSE** to open the disc tray.
2) Insert the update CD-R disc with the software update, label facing up.
3) Press **OPEN/CLOSE** to close the disc tray.

* It takes about 1~2 minites before the mesage below appears.

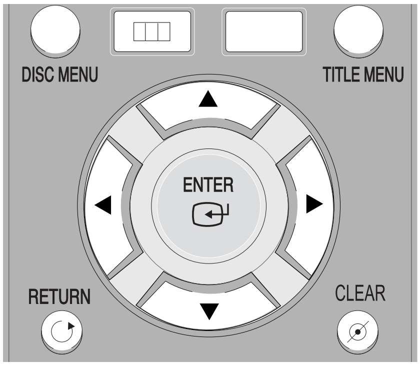


Fig. 4-2 Remote Control

Atfer checking old and new version, select “Yes” or “No” with “ ◀ ” or “ ▶ ” on the remote control.
* The Version is indicated by “XX.X modelname”

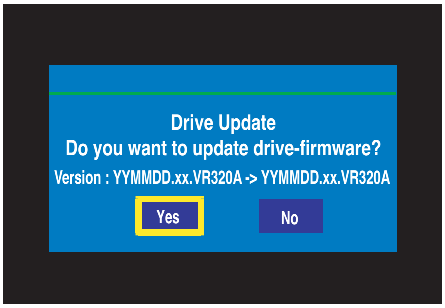

Drive Update
Do you want to update drive-firmware?
Version : YYMMDD.xx.VR320A -> YYMMDD.xx.VR320A

Fig. 4-1

* If you don’t see the message above, try another disc. Generally, this is caused by disc quality and by disc creating problem.

4) Press the **ENTER** button on the remote control (Fig. 4-2).

You will see “LOAD” on FLT Display.

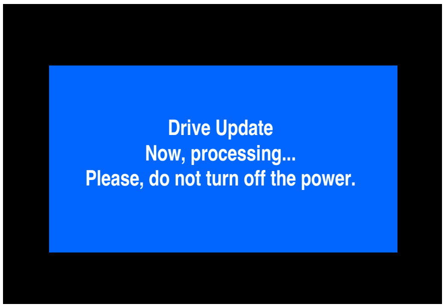

Drive Update
Now, processing...
Please, do not turn off the power.

Fig.4-3

5) It takes about 1~2 minutes to complete the update.
The message below will be displayed in the screen after update is completed and the tray will open automatically.

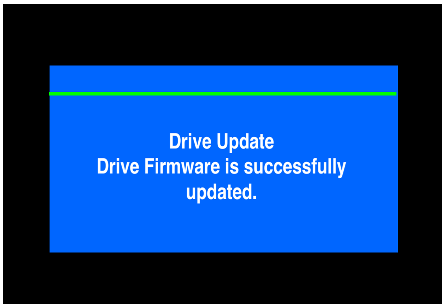

Drive Update
Drive Firmware is successfully updated.

Fig. 4-4

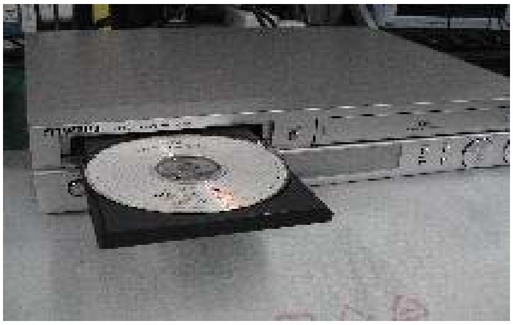


Fig. 4-5

6) After removing the update disc, turn off the unit with power button.
And there after turn on the unit with power button and then the will be closed.
The drive firmware is now completed.

4-2 Flash Update

4-2-1 Introduction

Samsung will often support software update to improve the performance of DVD Recorder&VCR to the latest staus, through Samsung Internet Site. (www. samsung.com)

4-2-2 How to make an update disc

Write the downloaded file onto a blank CD-R or CD-RW disc, using the following settings :

1) You have to download a newl file through Samsung Internet site. (www.samsung.com)

2) Write the file to disc using the CD-RW of your computer.

NOTE

- Recommended Application Program
  - Nero Burning / Easy CD Creator ..etc
- Option
  - Only single session
  - CD close & disc at once
  - ISO 9660 or joliet format
  - Extension name : "*.RUF"
- In order to increase dise playability, add a dummy file (over 100MB) together with the latest program.
  (The dummy file can be used any kind of file except MP3 file etc which can be played in the unit and we recommend to use a file whin extension name as "*.dmy", which can be changed from original one.)

WARNING

It is very important : please read the below notice below before updating your unit.

The followong events may interrupt the update process and MAY RESULT IN PERMANENT DAMAGE TO THE UNIT WHILE UPDATING

① Unplugging the power cord.

② Power Outage.

③ Dirt or Scratches on the disc.

④ Opening a disc tray during processing.

1) Press **OPEN/CLOSE** to open the disc tray.
2) Insert the update CD-R disc with the software update, label facing up.
3) Press **OPEN/CLOSE** to close the disc tray.

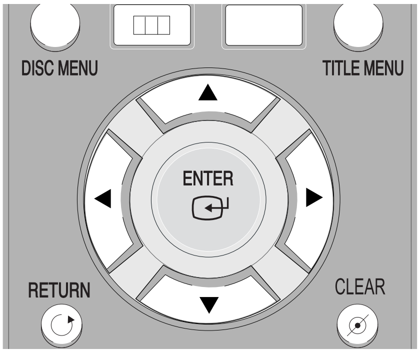
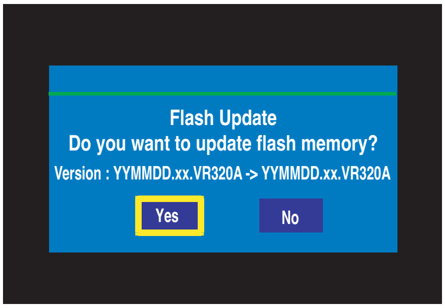


Fig. 4-7 Remote Control

Atfer checking old and new version, select “Yes” or “No” with “◀” or “▶” on the remote control.
* The Version is indicated by “YYMMDD.xx modelname”

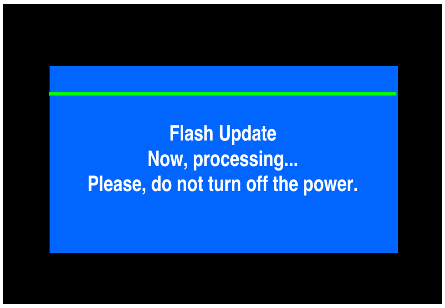


Flash Update
Do you want to update flash memory?
Version : YYMMDD.xx.VR320A -> YYMMDD.xx.VR320A

Fig. 4-6

* If you don’t see the message above, try another disc.
Generally, this is caused by disc quality and by disc creating problem.

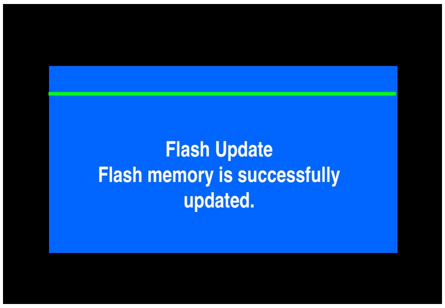
4) Press the **ENTER** button on the remote control (Fig. 4-7).



Flash Update
Now, processing...
Please, do not turn off the power.

Fig. 4-8

5) It takes about 5 minutes to complete the update.
The message below will be displayed in the screen after update is completed and the tray will open automatically.



Flash Update
Flash memory is successfully updated.

Fig. 4-9

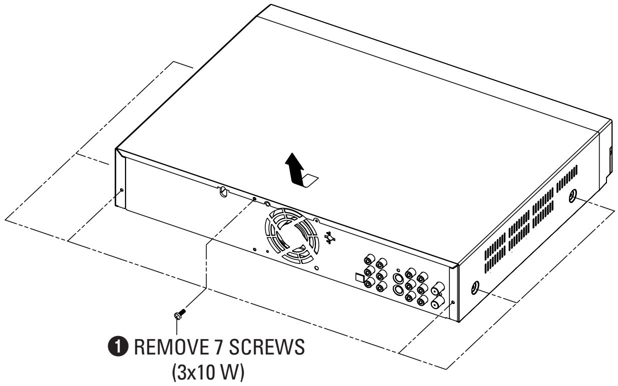
* If the message to the left isn’t displayed after 10minutes and the unit is no longer functioning properly, contact a samsung authorized service center.

6) After removing the update disc, turn off the unit with power button.
And there after turn on the unit with power button and then the will be closed.
The Flash update is now completed.

5. Disassembly and Reassembly

5-1 Cabinet and PCB

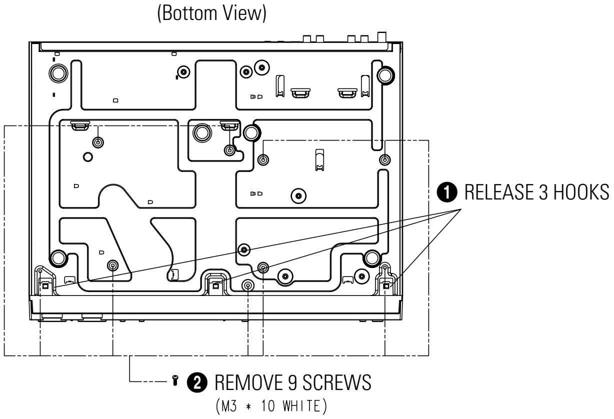
5-1-1 Cabinet Top Removal



❶ REMOVE 7 SCREWS
(3x10 W)

Fig. 5-1 Cabinet Top Removal

5-1-2 Ass'y Bottom Cover Removal



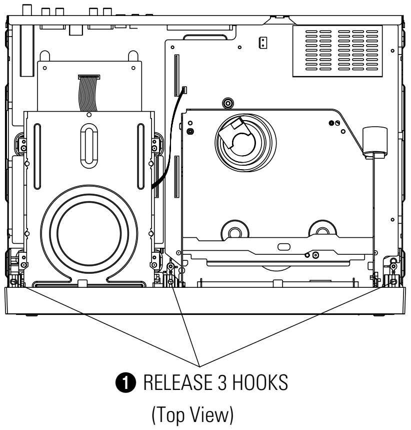
(Bottom View)

❶ RELEASE 3 HOOKS

❷ REMOVE 9 SCREWS
(M3 * 10 WHITE)

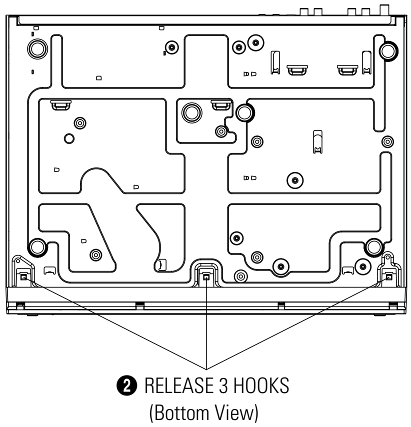
Fig. 5-2 Ass'y Bottom Cover Removal

5-1-3 Ass'y Front Panel Removal



❶ RELEASE 3 HOOKS
(Top View)

Fig. 5-3 Ass'y Front Panel Removal(Top View)



❷ RELEASE 3 HOOKS
(Bottom View)

Fig. 5-4 Ass'y Front Panel Removal(Bottom View)

5-1-4 Chassis Removal

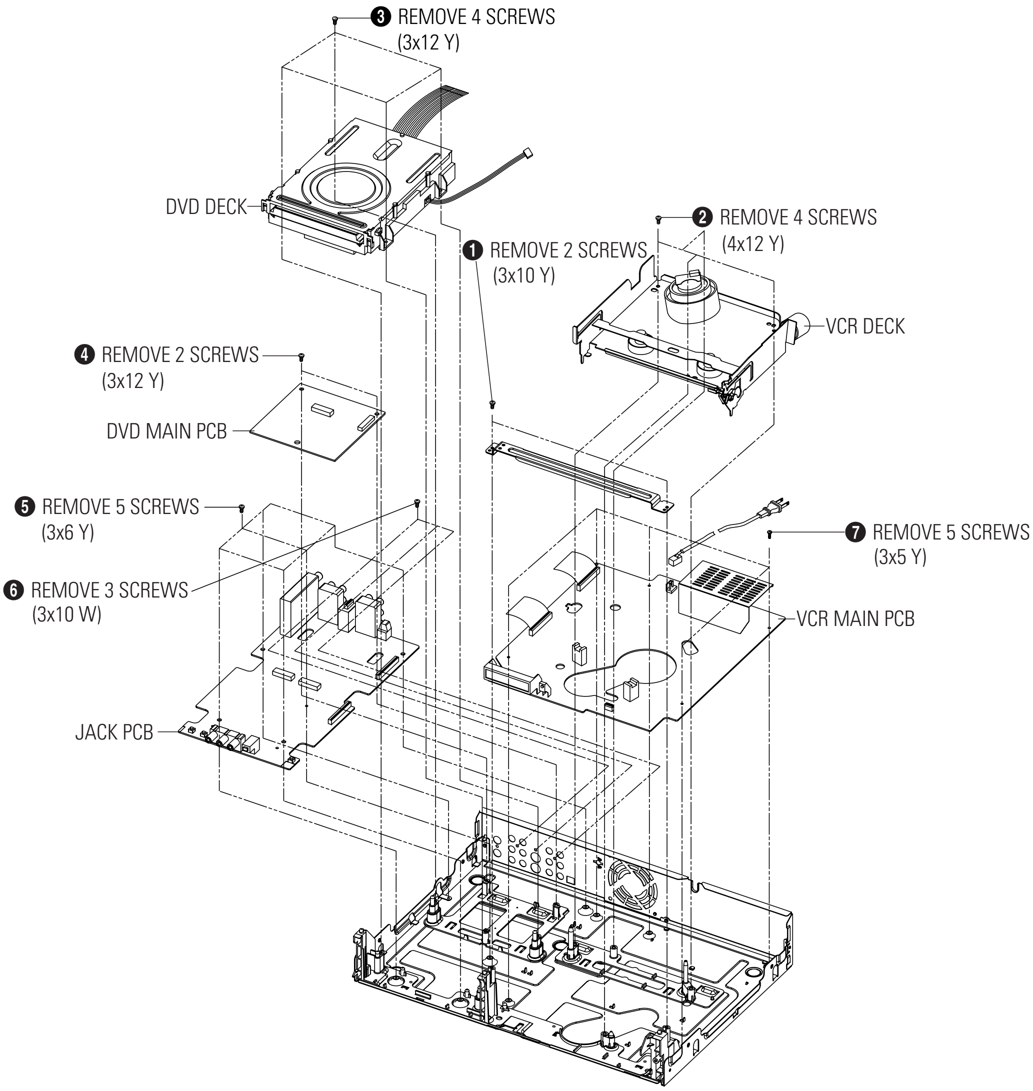
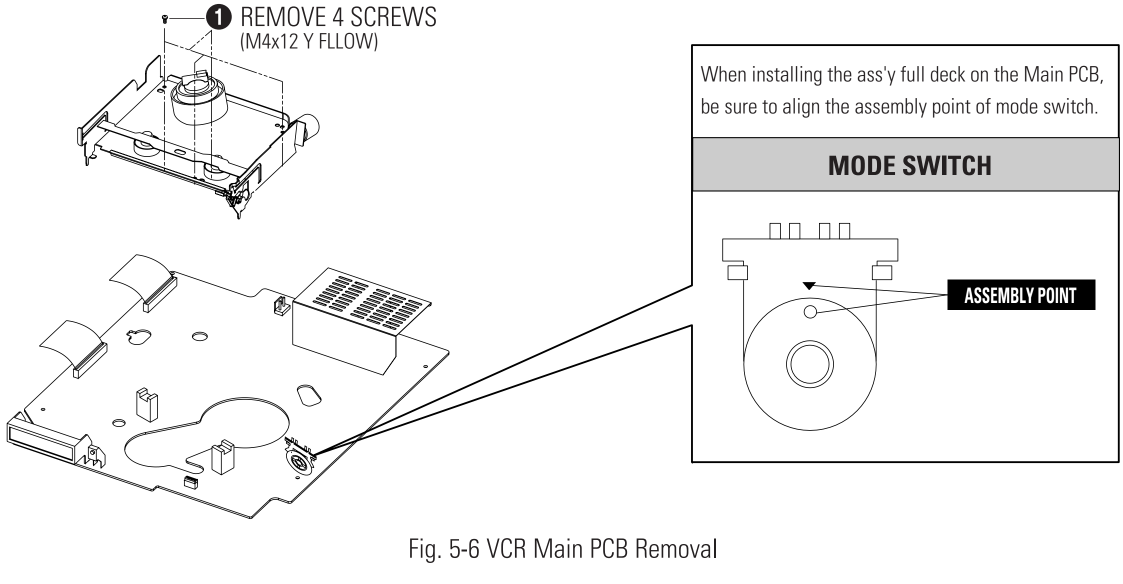

❸ REMOVE 4 SCREWS
(3x12 Y)
DVD DECK
❷ REMOVE 4 SCREWS
(4x12 Y)
❶ REMOVE 2 SCREWS
(3x10 Y)
VCR DECK
❹ REMOVE 2 SCREWS
(3x12 Y)
DVD MAIN PCB
❺ REMOVE 5 SCREWS
(3x6 Y)
❼ REMOVE 5 SCREWS
(3x5 Y)
❻ REMOVE 3 SCREWS
(3x10 W)
VCR MAIN PCB
JACK PCB

Fig. 5-5 Chassis Removal

5-1-5 VCR Main PCB Removal


❶ REMOVE 4 SCREWS
(M4x12 Y FLLOW)
MODE SWITCH
ASSEMBLY POINT

When installing the ass'y full deck on the Main PCB, be sure to align the assembly point of mode switch.

Fig. 5-6 VCR Main PCB Removal

5-2 Circuit Board Locations

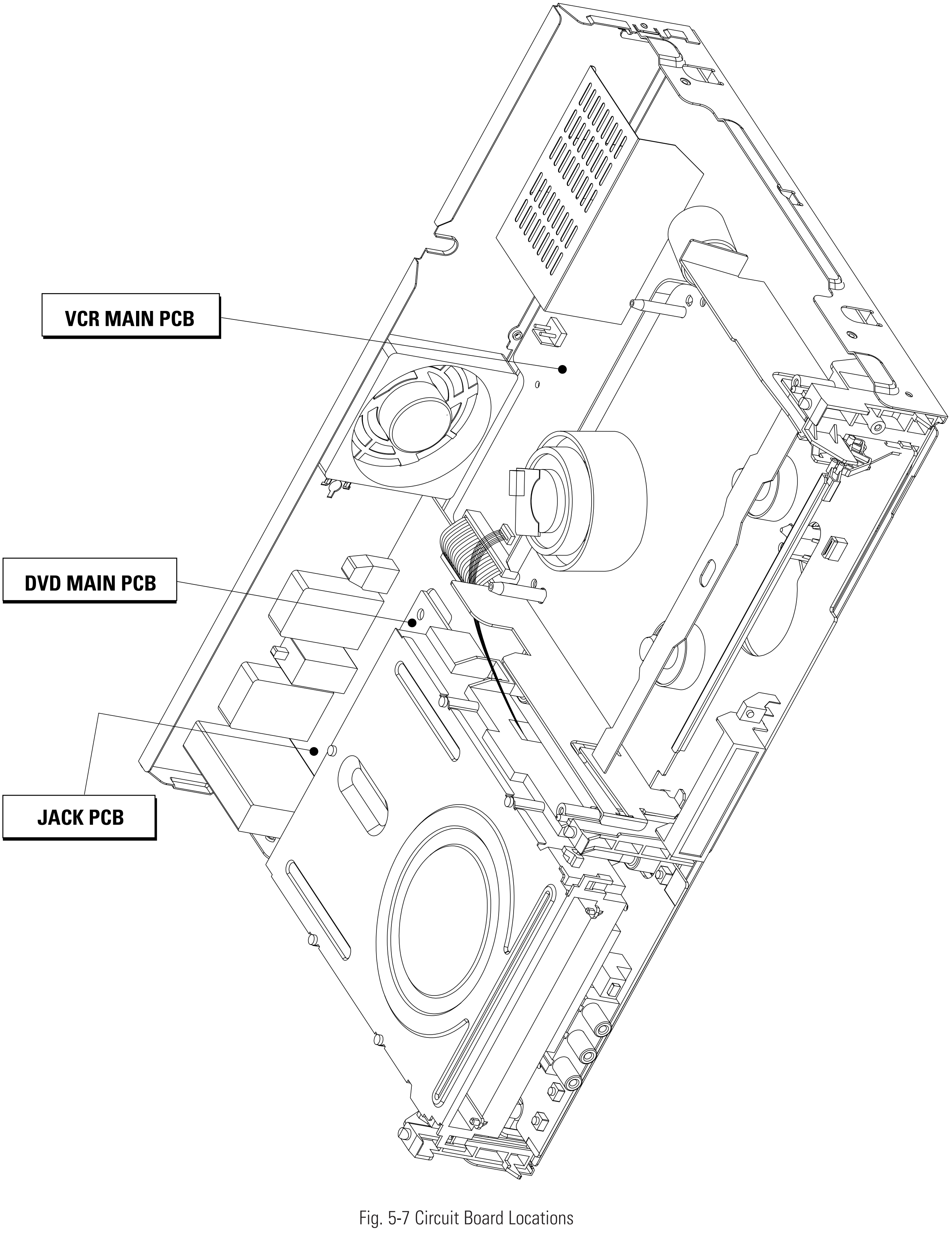

VCR MAIN PCB
DVD MAIN PCB
JACK PCB

Fig. 5-7 Circuit Board Locations

5-3 VCR Deck Parts Locations

5-3-1 Top View

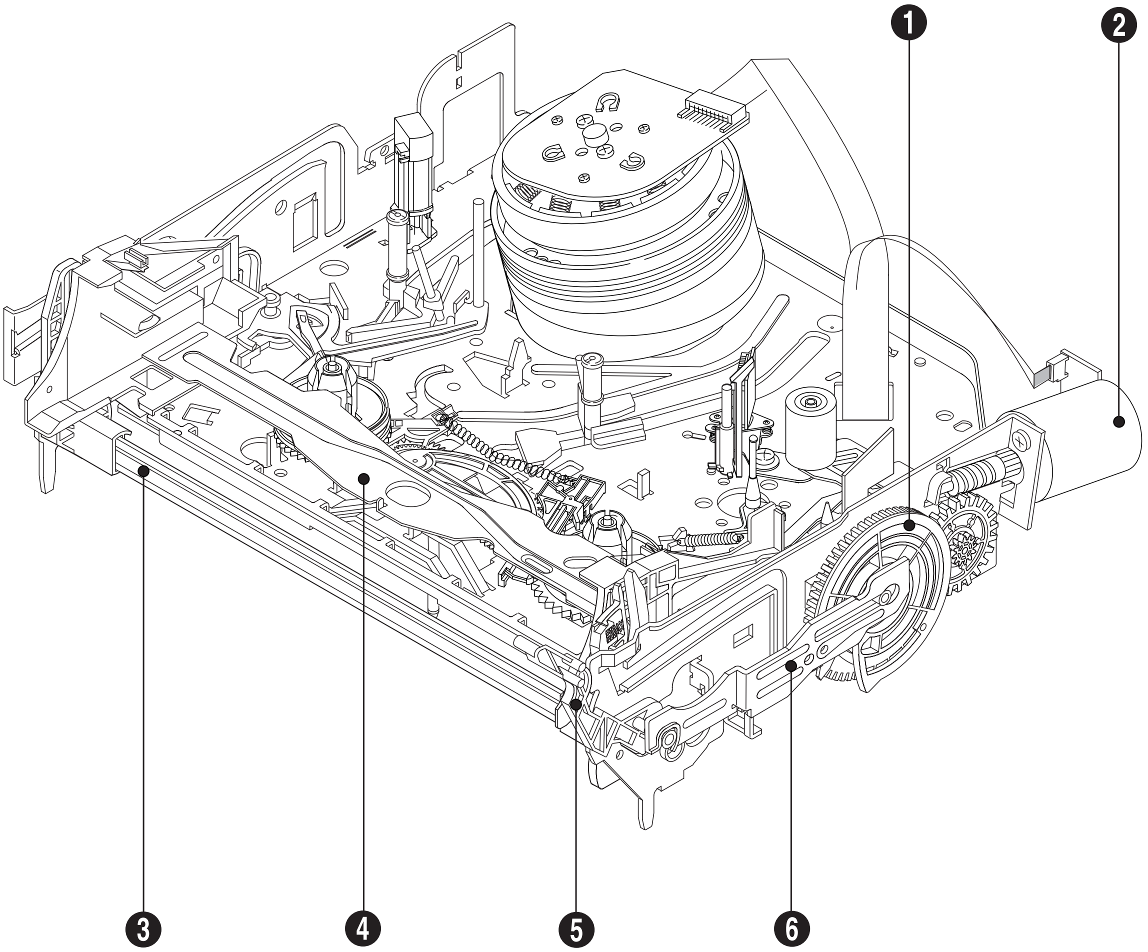


Fig. 5-8 Top parts Location-1

❶ GEAR FL CAM
❷ MOTOR LOADING ASS'Y
❸ LEVER FL ARM ASS'Y
❹ HOLDER FL CASSETTE ASS'Y
❺ LEVER FL DOOR
❻ SLIDER FL DRIVE

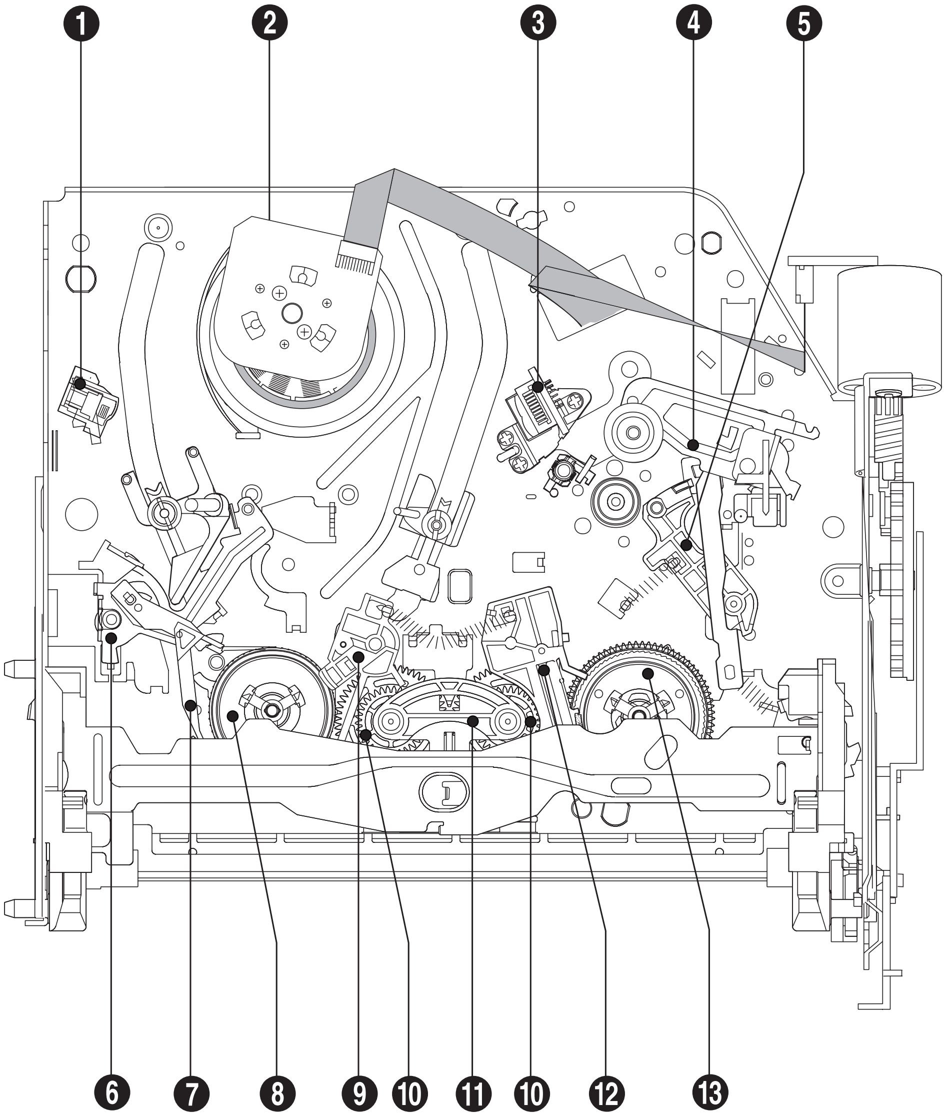


Fig. 5-9 Top Parts Location-2

- ❶ FE HEAD
- ❷ CYLINDER ASS'Y
- ❸ ACE HEAD ASS'Y
- ❹ LEVER UNIT PINCH ASS'Y
- ❺ LEVER #9 GUIDE ASS'Y
- ❻ LEVER TENSION ASS'Y
- ❼ BAND BRAKE ASS'Y
- ❽ DISK S REEL
- ❾ LEVER S BRAKE ASS'Y
- ❿ GEAR IDLE
- ⓫ LEVER IDLE
- ⓬ LEVER T BRAKE ASS'Y
- ⓭ DISK T REEL

5-3-2 Bottom View

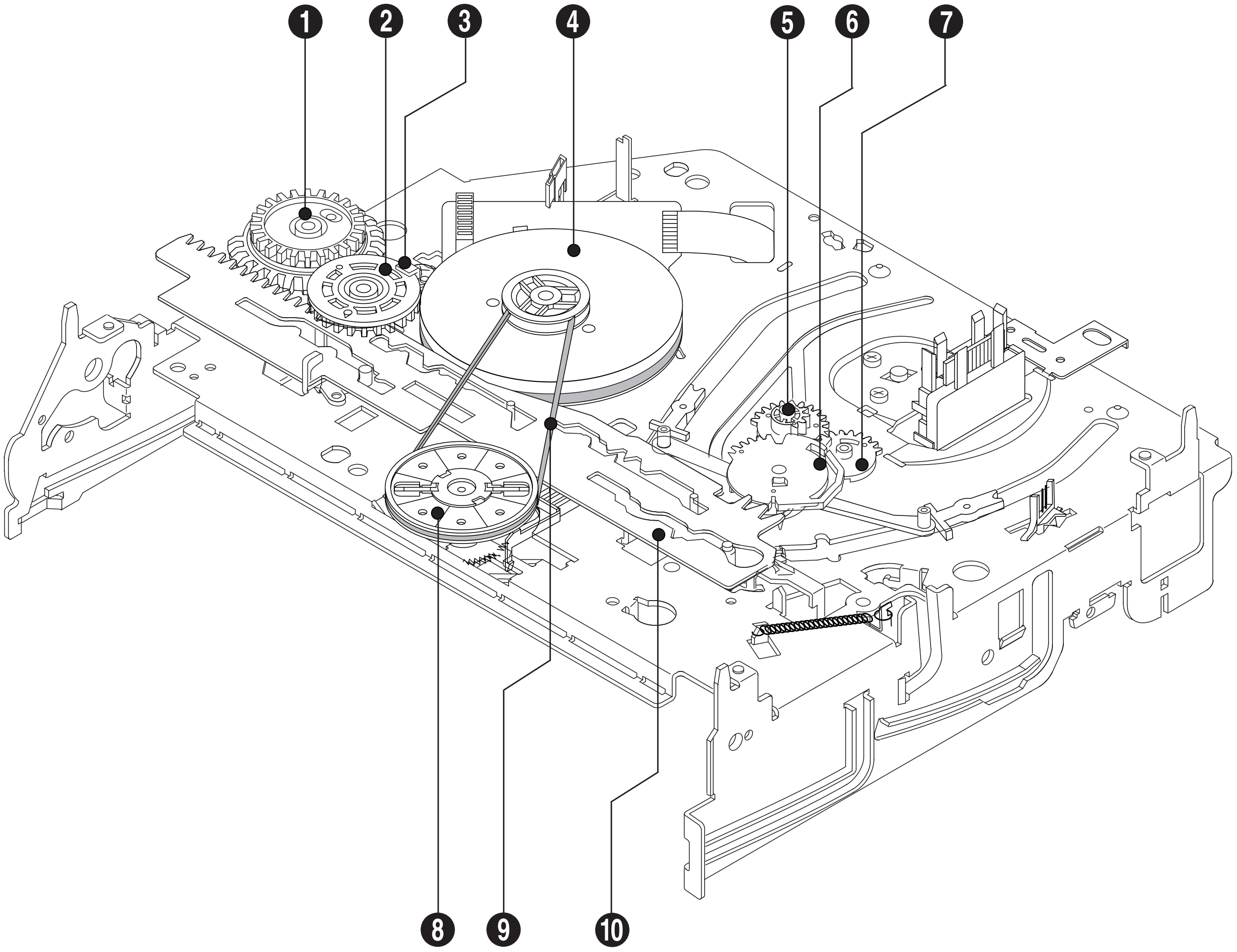


Fig. 5-10 Bottom Parts Location

❶ GEAR JOINT 1
❷ GEAR JOINT 2
❸ BRAKET GEAR
❹ MOTOR CAPSTAN ASS'Y
❺ LEVER T LOAD ASS'Y
❻ GEAR LOADING DRIVE
❼ LEVER S LOAD ASS'Y
❽ HOLDER CLUTCH ASS'Y
❾ BELT PULLEY
❿ SLIDER CAM

5-4 VCR Deck

5-4-1 Holder FL Cassette Ass’y Removal

1) Pull the Holder FL Cassette Ass'y ❶ to the eject position.
2) Pull the Holder FL Cassette Ass'y ❶ as grasping the Holder FL Cassette Ass'y ❶ and Lever FL Cassette-R ❷ in the same time to release hooking from Main Base until the Boss [A] of Holder FL Cassette Ass'y ❶ is taken out from the Rail [B].
3) Lift the Holder FL Cassette Ass'y ❶, in this time, you have to grasp the Lever FL Cassette-R ❷ Continuously until the Holder FL Cassette Ass'y ❶ is taken out completely.

Note : Be sure to insert Lever FL Cassette-R ❷ in the direction of “A” to prevent separation and breakage of the Lever FL Cassette-R ❷ at disassembling and reassembling.

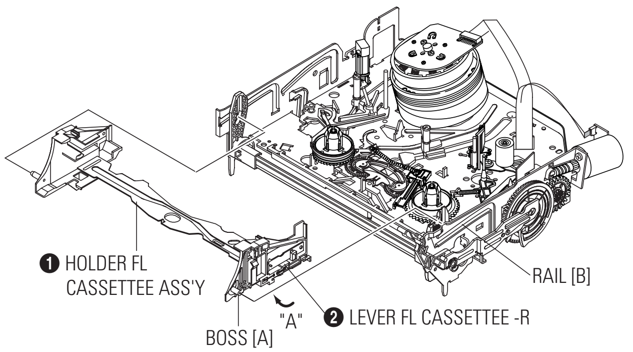


Fig. 5-11 Holder FL Cassette Ass’y Removal

5-4-2 Lever FL Arm Ass’y Removal

1) Push the hole “A” in the direction of arrow “B” use the pin.(about Dia. 2.5)
2) Pull out the Lever FL Arm Ass'y ❶ from the Boss of Main Base.
3) Remove the Lever FL Arm Ass'y ❶ in the direction of arrow “C”.

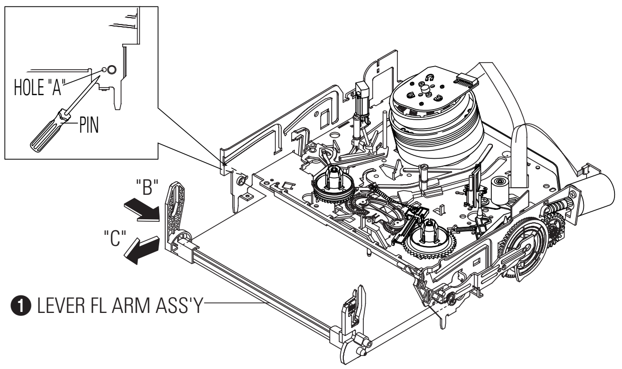


Fig. 5-12 Lever FL Arm Ass’y Removal

5-4-3 Lever FL Door Removal

1) Release the Hook ❷ and Remove the Lever FL Door ❶ in the direction of arrow "A".

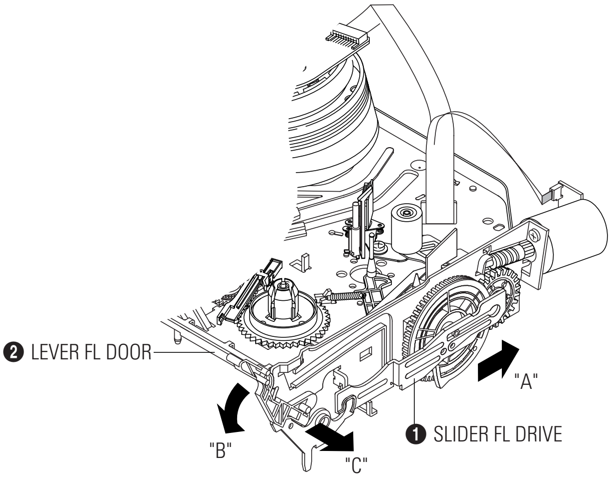

❷ LEVER FL DOOR
"A"
"B"
"C"
❶ SLIDER FL DRIVE

Fig. 5-13 Lever FL Door Removal

5-4-4 Slider FL Drive, Gear FL Cam Removal

1) Pull the Slider FL Drive ❶ to the front direction.
2) Remove the Slider FL Drive ❶ in the direction of arrow. (Refer to Fig. 5-13)
3) Remove the Gear FL cam ❷.

Note : When reinstalling be sure to reassemble Slider FL drive ❶ after you insert the Boss of Lever FL ARM-R in Groove of Slider Fl drive ❶.

Assembly : Align the Gear FL Cam ❶ with the Gear worm wheel Post as shown drawing. (Refer to Timing point)

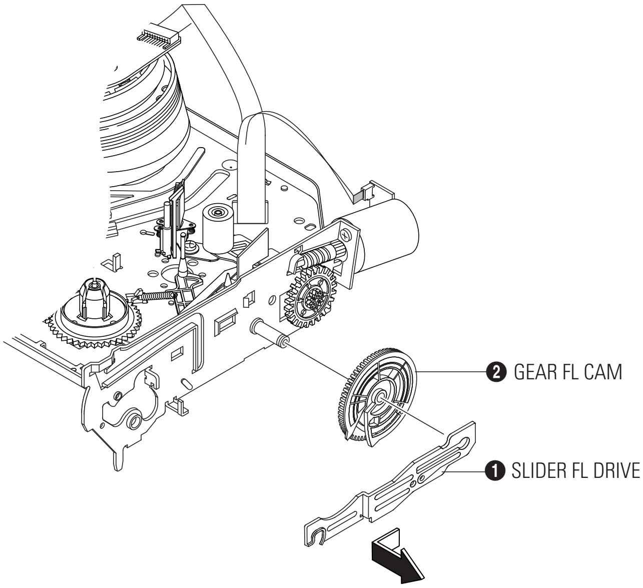

❷ GEAR FL CAM
❶ SLIDER FL DRIVE

Fig. 5-14 Slider FL Drive Removal

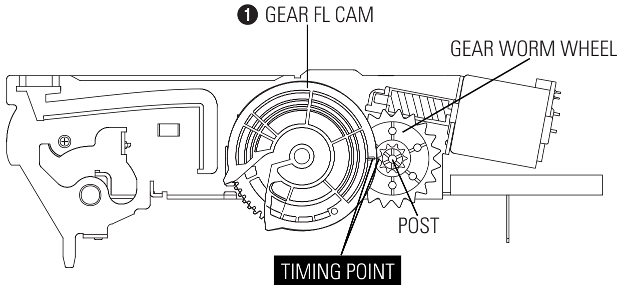

❶ GEAR FL CAM
GEAR WORM WHEEL
POST
TIMING POINT

Fig. 5-15 Gear FL Cam, Gear Worm

5-4-5 Gear Worm Wheel Removal

1) Remove the Gear Worm wheel ❶.

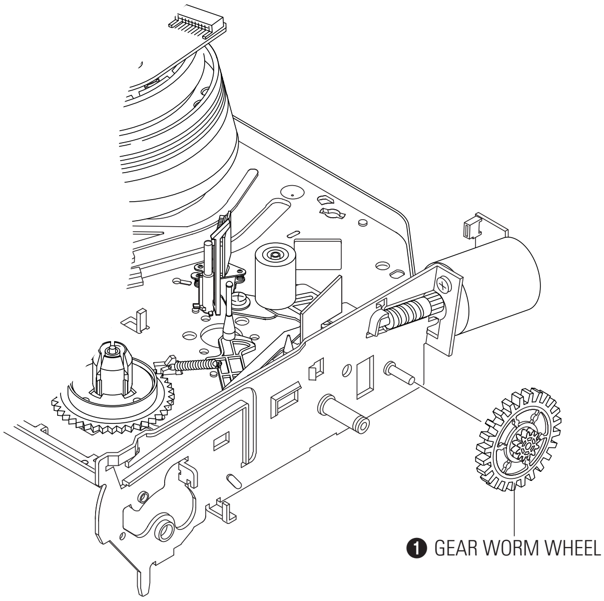

❶ GEAR WORM WHEEL

Fig. 5-16 Gear Worm Wheel Removal

5-4-6 Cable Flat Removal

1) Remove the Drum connecting part of Cable Flat ❶ from Connector Waffer ❷.
2) Remove the Loading Motor connecting part of Cable Flat ❶ from Connector Waffer ❸.

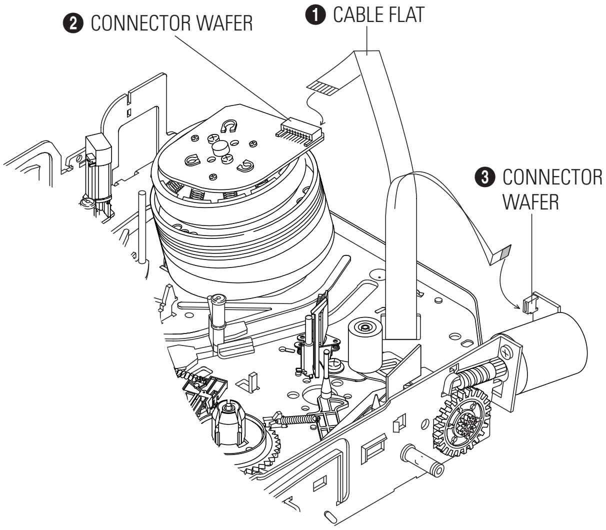

❷ CONNECTOR WAFER
❶ CABLE FLAT
❸ CONNECTOR WAFER

Fig. 5-17 Cable Flat Removal

5-4-7 Motor Loading Ass'y Removal

1) Remove the screw ❶.
2) Remove the Motor Loading Ass'y ❷.

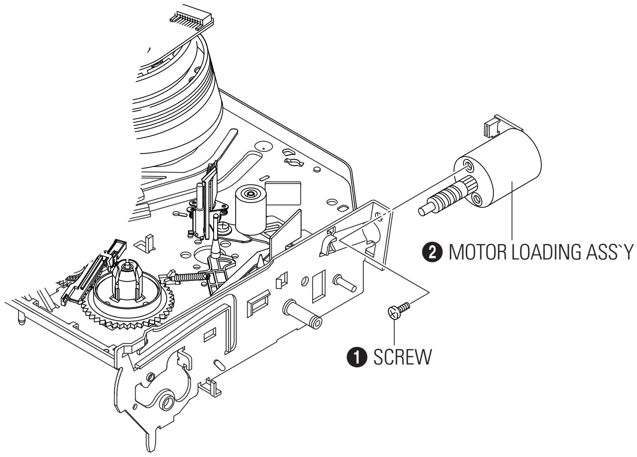

❷ MOTOR LOADING ASS`Y
❶ SCREW

Fig.5-18 Motor Loading Ass'y Removal

5-4-8 Bracket Gear, Gear Joint 2, 1 Removal

1) Remove the SCREW ❶.
2) Remove the Bracket Gear ❷.
3) Remove the Gear Joint 2 ❸.
4) Remove the Gear Joint 1 ❹.

Assembly :
1) Be sure to align dot mark of Gear Joint 1 ❶ with dot mark of Gear Joint 2 ❷ as shown Fig 5-20. (Refer to Timing point1)
2) Confirm the Timing Point 2 of the Gear Joint 2 ❷ and Slider Cam ❸.

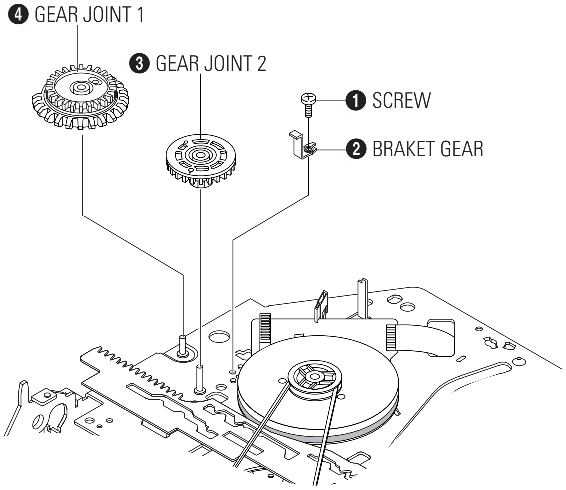

❹ GEAR JOINT 1
❸ GEAR JOINT 2
❶ SCREW
❷ BRAKET GEAR

Fig. 5-19 Bracket Gear, Gear Joint 1,2 Removal

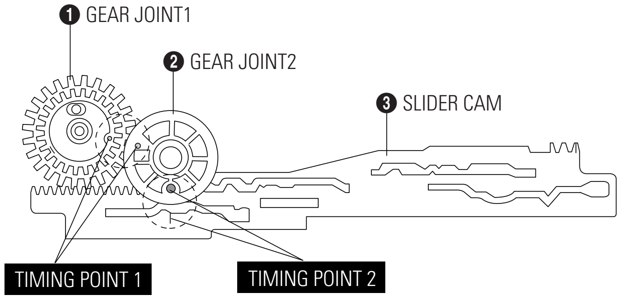

❶ GEAR JOINT1
❷ GEAR JOINT2
❸ SLIDER CAM
TIMING POINT 1
TIMING POINT 2

Fig. 5-20 Gear Joint 1,2 Assembly

5-4-9 Gear Loading Drive, Slider Cam, Lever Load S, T Ass’y Removal

1) Remove the Belt Pulley. (Refer to Fig. 5-38)
2) Remove the Gear Loading Drive ❶ after releasing Hook [A] in the direction arrow as shown in detail drawing.
3) Remove the Slider Cam ❷.
4) Remove the Lever Load S Ass’y ❸ & Lever Load T Ass’y ❹.

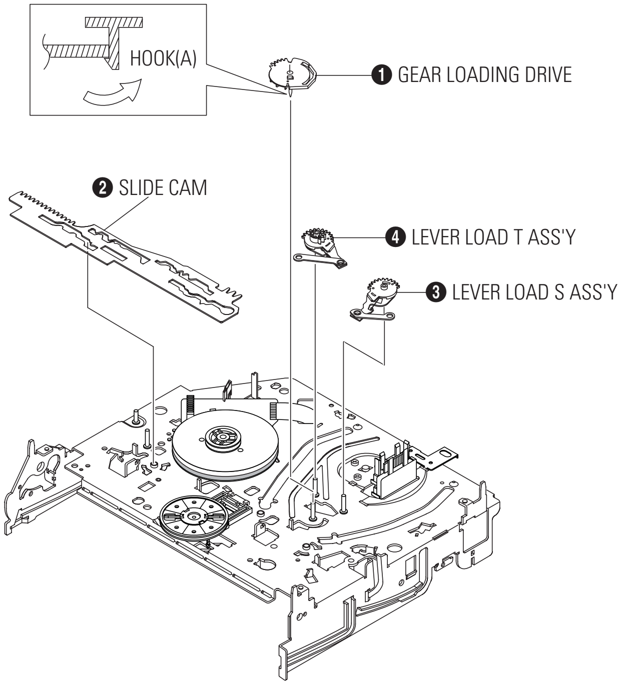

HOOK(A)
❶ GEAR LOADING DRIVE
❷ SLIDE CAM
❹ LEVER LOAD T ASS'Y
❸ LEVER LOAD S ASS'Y

Fig. 5-21 Gear Loading Drive, Slider Cam, Lever T, S Load Ass’y Removal

5-4-10 Gear Loading Drive, Slider Cam, Lever Load S, T Ass’y Assembly

1) When reinstalling, be sure to align dot of Lever Load T Ass'y ❶ with dot of Lever Load S Ass'y ❷ as shown in drawing, (Refer to Timing Point 1).
2) Insert the Pin A,B,C,D into the Slider Cam ❸ hole,
3) Be sure to align dot of Lever Load T ❶ and dot of Gear Loading Drive ❹, (Refer to Timing Point 2).
4) Aline dot of Gear Loading drive ❹ with mark of Slider Cam ❸ as shown in drawing(Refer to Timing Point 3).

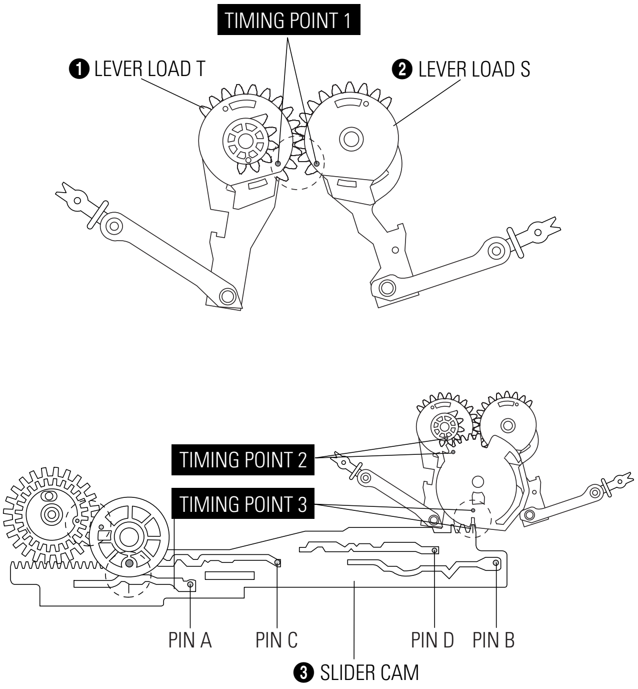

TIMING POINT 1
❶ LEVER LOAD T
❷ LEVER LOAD S
TIMING POINT 2
TIMING POINT 3
PIN A
PIN C
PIN D
PIN B
❸ SLIDER CAM

Fig. 5-22 Gear Loading Drive, Slider Cam, Lever Load S, T Ass’y Assembly

5-4-11 Lever Pinch Drive, Lever Tension Drive Removal

1) Remove the Lever Pinch Drive ❶, Lever Tension Drive ❷.

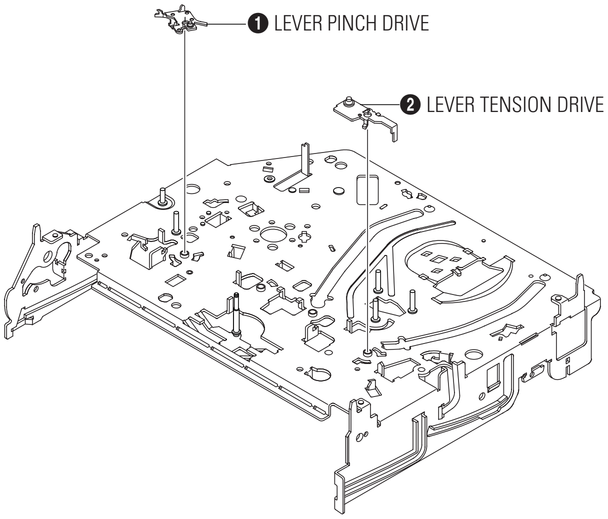

❶ LEVER PINCH DRIVE
❷ LEVER TENSION DRIVE

Fig. 5-23 Lever Pinch Drive, Lever Tension Drive Removal

5-4-12 Lever Tension Ass'y, Band Brake Ass'y Removal

1) Remove the Lever Brake S Ass'y (Refer to Fig 5-25).
2) Remove the Spring Tension Lever ❶.
3) Rotate stopper of Main Base in the direction of arrow "A".
4) Lift the Lever Tension Ass'y ❷ & Band brake Ass'y ❸.

Note :
1) When replacing the Lever Tension Ass'y ❷, be sure to apply Grease on the post,
2) Take care not to touch stain on the felt side, and not to be folder and broken Band brake Ass'y
3) After Lever Tension Ass'y seated, Rotate stopper of Main Base to the Mark[B].

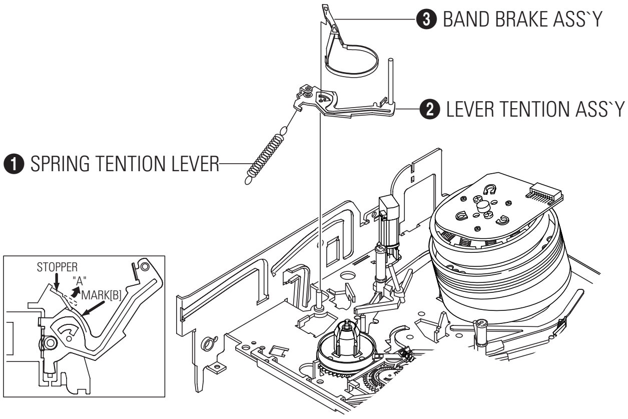

❸ BAND BRAKE ASS`Y
❷ LEVER TENTION ASS`Y
❶ SPRING TENTION LEVER
STOPPER
"A"
MARK[B]

Fig. 5-24 Lever Tension Ass'y, Band Brake Ass'y Removal

5-4-13 Lever Brake S, T Ass’y Removal

1) Release the Hook [A] and the Hook [B], [C] in the direction of arrow as shown in Fig 5-25.
2) Lift the Lever S, T Brake Ass'y ❶, ❷ with spring brake ❸.

Assembly :
1)Assembly the Lever S Brake Ass'y ❶ on the Main Base.
2)Assembly the Lever T Brake Ass'y ❷ with spring brake ❸.

Note : Take extreme care not to be folded and transformed Spring Brake at removing or reinstalling.

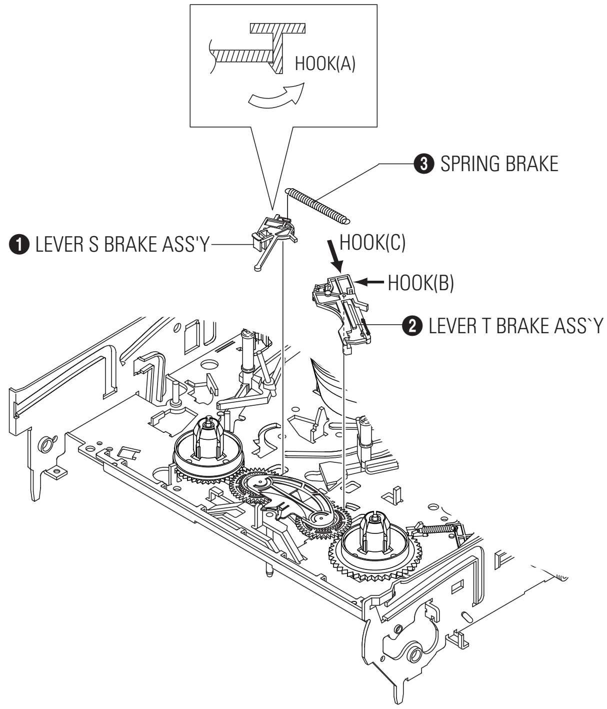

HOOK(A)
❸ SPRING BRAKE
❶ LEVER S BRAKE ASS'Y
HOOK(C)
HOOK(B)
❷ LEVER T BRAKE ASS`Y

Fig. 5-25 Lever Brake S, T Ass’y Removal

5-4-14 Gear Idle Ass’y Removal

1) Push the Lever Idle ❶ in the direction of arrow “A”, “B”.
2) Lift the Lever Idle ❶.

Assembly :
1) Apply oil in two Bosses of Lever Idle ❶.
2) Assemble the Gear Idle ❷ with the Lever Idle ❶.

Note : When replacing the Gear Idle ❷, be sure to add oil in the boss of Lever Idle ❶.

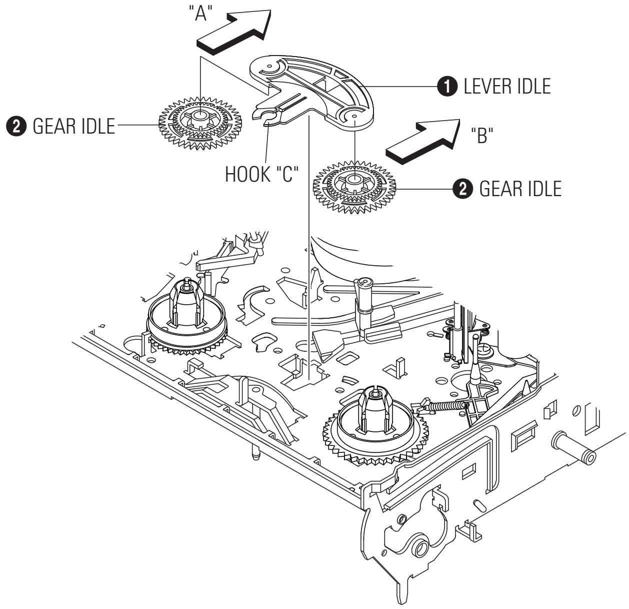

"A"
❶ LEVER IDLE
❷ GEAR IDLE
"B"
HOOK "C"
❷ GEAR IDLE

Fig. 5-26 Gear Idle Ass’y Removal

5-4-15 Disk S, T Reel Removal

1) Lift the Disk S, T Reel ❶, ❷.

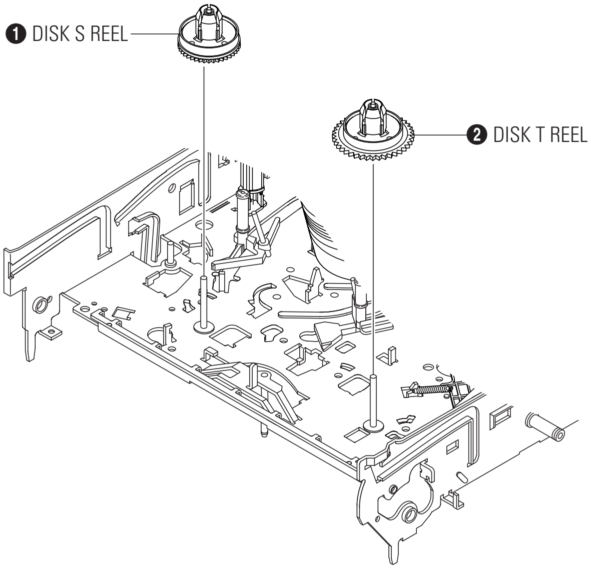

❶ DISK S REEL
❷ DISK T REEL

Fig. 5-27 Disk S, T Reel Removal

5-4-16 Holder Clutch Ass'y Removal

1) Remove the Washer Slit ❶.
2) Lift the Holder Clutch Ass'y ❷.

Note : When you reinstall Holder Clutch Ass'y
1) Check the condition of spring as shown in detail A.
2) Don't push Holder Clutch Ass'y down with excessive force Just insert Holder Clutch Ass'y into post center with dead force and Rotate it smoothly.
Be sure to confirm that spring is in the slit of Gear Center Ass'y as shown in detail B.

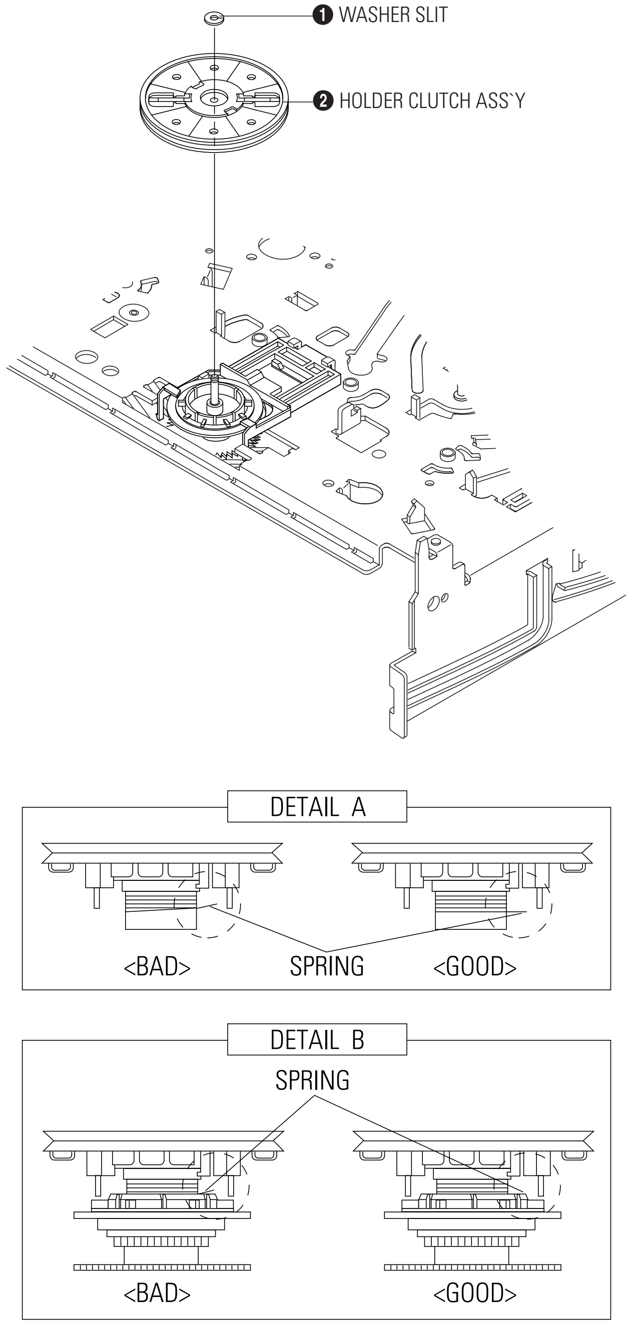

❶ WASHER SLIT
❷ HOLDER CLUTCH ASS`Y
DETAIL A
<BAD>
SPRING
<GOOD>
DETAIL B
SPRING
<BAD>
<GOOD>

Fig. 5-28 Holder Clutch Ass'y Removal

5-4-17 Lever Up Down Ass’y, Gear Center Ass’y Removal

1) Remove the 2 hooks in the direction of arrow as shown Fig. 5-28 and lift the Lever Up Down Ass’y ❶.
2) Lift the Gear Center Ass’y ❷.

Assembly :
1) Insert the Lever Up Down Ass'y ❶ in the rectangular holes on Main Base as shown in Fig 5-30.
2) Lift the Lever Up Down Ass'y ❶ about 35°. (Refer to Fig 5-30)
3) Insert Ring of the Gear Center Ass'y ❷ in the Guide of the Lever Up Down Ass'y ❶.
4) Insert the Gear Center Ass'y ❷ in the post on Main Base.
5) Push down the Lever Up Down Ass'y ❶ for locking of the Hook.

Note :
1) Take care not to separate and sentence does not mark sense.
2) Be sure to confirm that Ring of the Gear Center Ass'y ❷ is in the Guide of the Lever Up Down Ass'y ❶ after finishing assembly of Lever Up Down Ass'y ❶ and Gear Center Ass'y ❷.

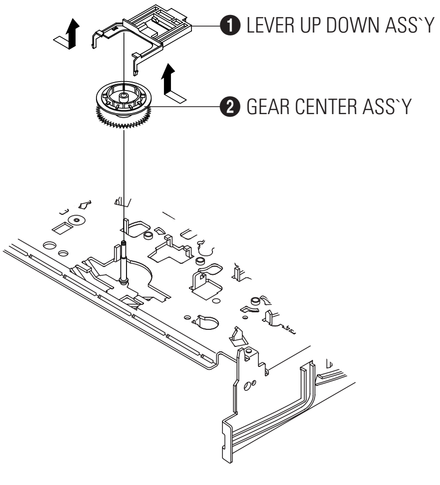

❶ LEVER UP DOWN ASS`Y
❷ GEAR CENTER ASS`Y

Fig. 5-29 Lever Up Down Ass’y Removal

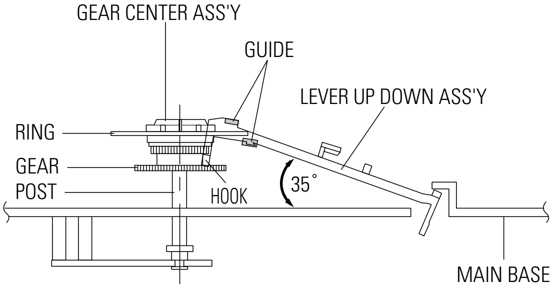

GEAR CENTER ASS'Y
GUIDE
LEVER UP DOWN ASS'Y
RING
GEAR
POST
HOOK
35˚
MAIN BASE

Fig. 5-30 Lever Up Down Ass’y Removal

5-4-18 Guide Cassette Door Removal

1) Lift the Hook [A].
2) Rotate the Guide Cassette Door ❶ in the direction of arrow.

Note : After reinstalling the Guide Cassette Door ❶ sure the Hook [A].

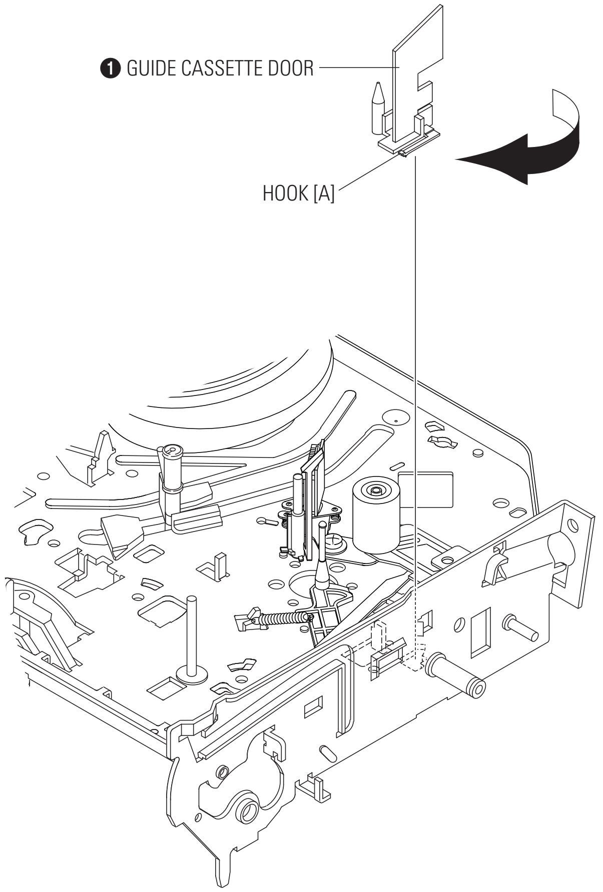

❶ GUIDE CASSETTE DOOR
HOOK [A]

Fig. 5-31 Guide Cassette Door Removal

5-4-19 Lever Unit Pinch Ass'y, Plate Joint, Spring Pinch Drive Removal

1) Lift the Unit Pinch Ass'y ❶.
2) Remove the Plate Joint ❷ from Lever Pinch Drive.
3) Remove the Spring Pinch Drive ❸.

Note :
1) Take extreme care not to touch the grease on the Roller Pinch.
2) When reinstalling, be sure to apply grease on the post pinch roller.

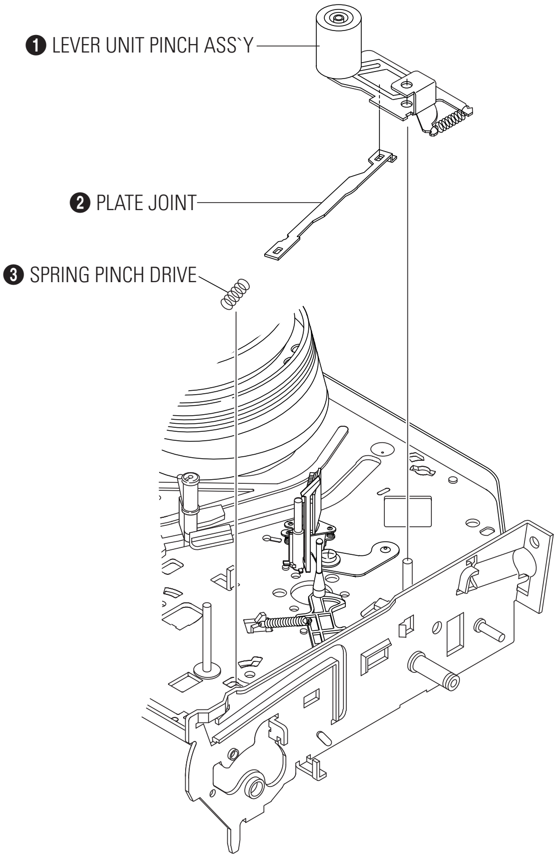

❶ LEVER UNIT PINCH ASS`Y
❷ PLATE JOINT
❸ SPRING PINCH DRIVE

Fig. 5-32 Lever Unit Pinch Ass'y, Plate Joint, Spring Pinch Drive Removal

5-4-20 Lever #9 Guide Ass'y Removal

1) Remove the Spring #9 Guide ❶.
2) Lift the Spring #9 Guide Ass'y ❷ in the direction of arrow "A".

Note :
1) Take extreme care not to get grease on the tape Guide Post.
2) After reinstalling, check the bottom side of the Post #9 Guide to the top side of Main Base.

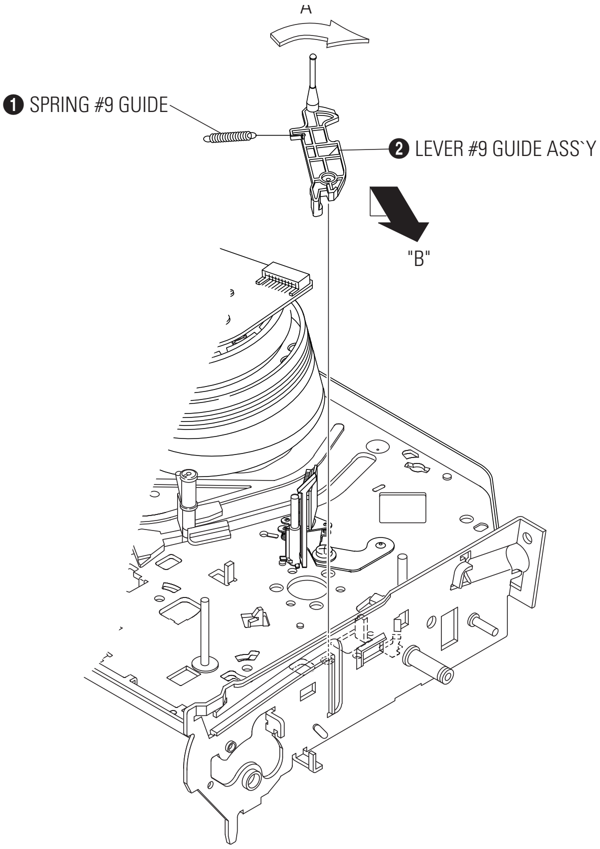

A
❶ SPRING #9 GUIDE
❷ LEVER #9 GUIDE ASS`Y
"B"

Fig. 5-33 Lever #9 Guide Ass'y Removal

5-4-21 FE Head Removal

1) Remove the screw ❶.
2) Lift the FE Head ❷.

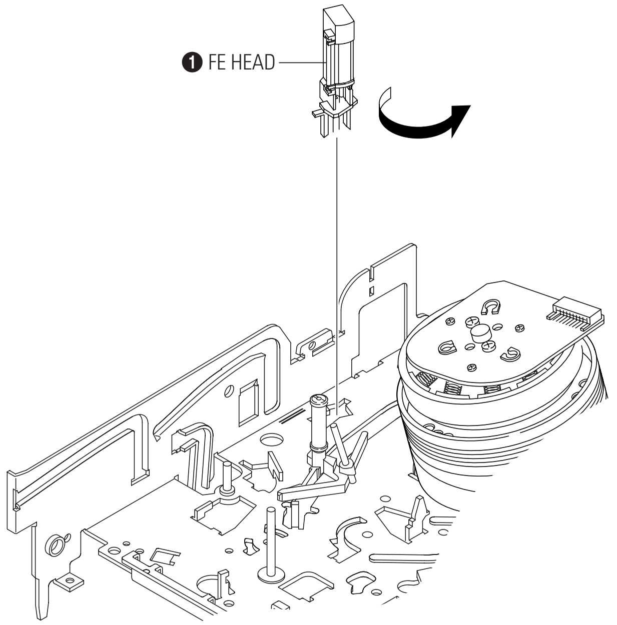


Fig. 5-34 FE Head Removal

5-4-22 ACE Head Removal

1) Pull out the FPC from connector of ACE Head Ass’y ❷.
2) Remove the screw ❶.
3) Lift the ACE Head Ass’y ❷.

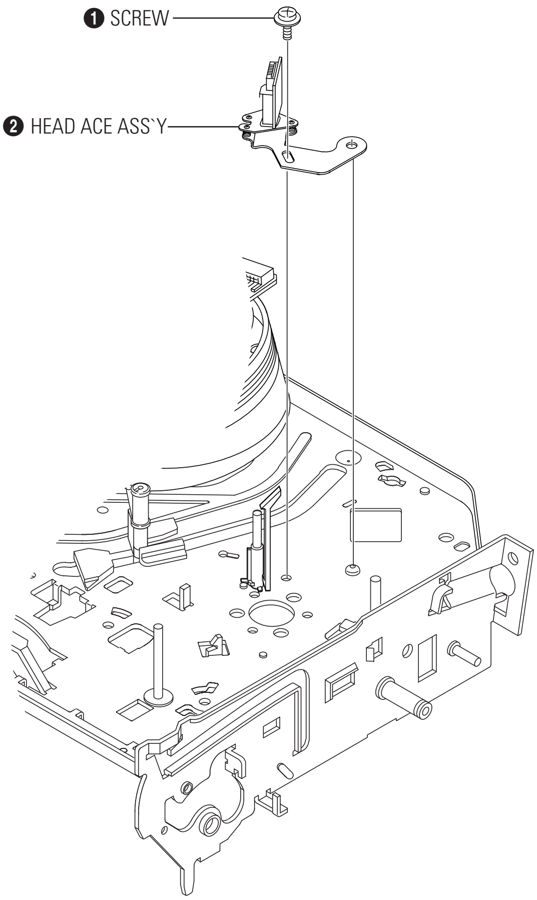


Fig. 5-35 ACE Head Removal

5-4-23 Slider S, T Ass’y Removal

1) Move the Slider S, T Ass’y ❶, ❷ to slot, and then lift it to remove. (Refer to arrow)

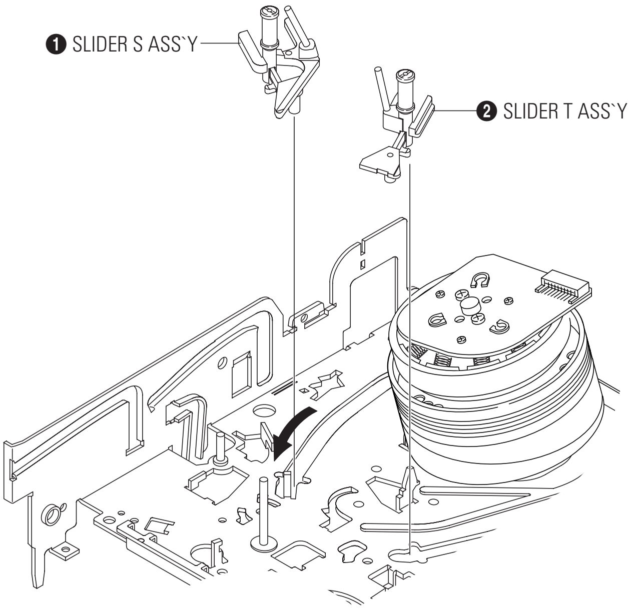


Fig. 5-36 Slider S, T Ass’y Removal

5-4-24 Plate Ground Deck, Cylinder Ass’y Removal

1) Remove the 3 Screws ❶.
2) Lift the Plate Ground Deck ❷.
3) Lift the Cylinder Ass’y ❸.

Assembly :
1) Match the 3 holes in the bottom of Cylinder ass'y ❸ to the 3 holes of Main Base as attending not to drop or knock the Cylinder ass'y ❸.
2) Tighten the 1 Screw ❶.
3) Match the Plate Ground Deck ❷ to the Hole of Base Main.
4) Tighten the other 2 Screws ❶.

Note :
1) Take care not to touch the Cylinder Ass'y ❸ and the tape guide post at reinstalling.
2) When reinstalling, Don't push down too much on Screw Driver.

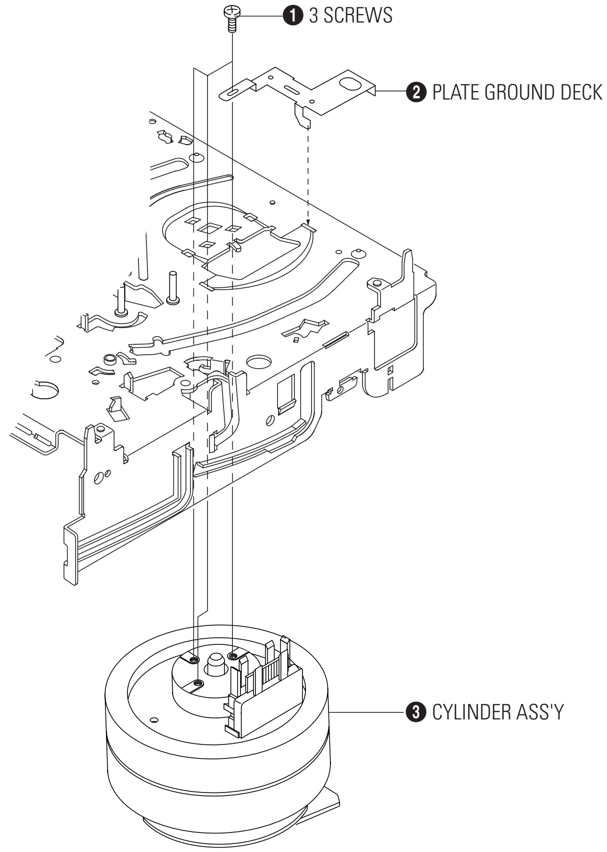


Fig. 5-37 Plate Ground Deck, Cylinder Ass’y Removal

5-4-25 Hook Capstan, Belt Pulley Removal

1) Remove the Hook Capstan ❶ after realeasing Hook in the direction arrow as shown in detail drawing.
2) Remove the Belt Pulley ❷.

Note : Take extreme care not to get grease on Belt Pulley ❷ at assembling or reassembling.

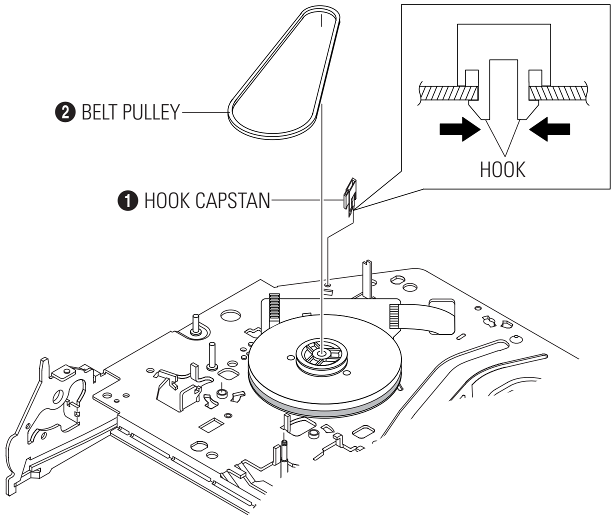


Fig. 5-38 Hook Capstan, Belt Pulley Removal

5-4-26 Motor Capstan Ass’y Removal

1) Remove the Damper Capstan ❶ in the direction of arrow.
2) Remove the 3 Screws ❷.
3) Remove the Motor Capstan Ass’y ❸.

Assembly :
1) Match the 3 holes of Motor Capstan Ass’y ❸ to the 3 holes of Main Base. Be careful not to drop or knock the Motor Capstan Ass'y ❸.
2) Tighten the 3 Screws ❷ in the direction of arrow as shown detail drawing.
3) Assemble the Damper Capstan ❶.

Note : After tightening screws, check if there is gap between the head of screws and the top side of Main Base. There should have no gap between the head of screws and the top side of Main Base.
After reinstalling, adjusting the tape transport system again.

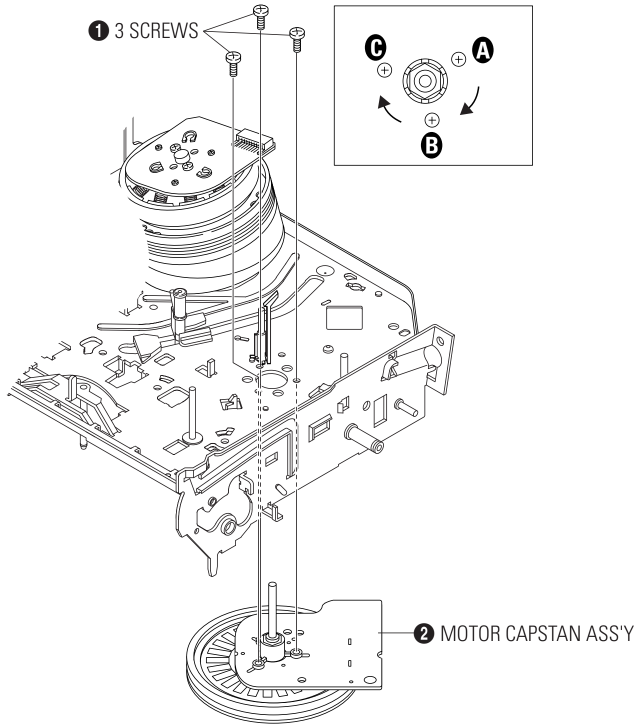


Fig. 5-39 Motor Capstan Ass’y Removal

5-4-27 Post #8 Guide Ass'y Removal

1) Rotate the Post #8 Guide Ass'y ❶ in the direction of arrow to lift up.

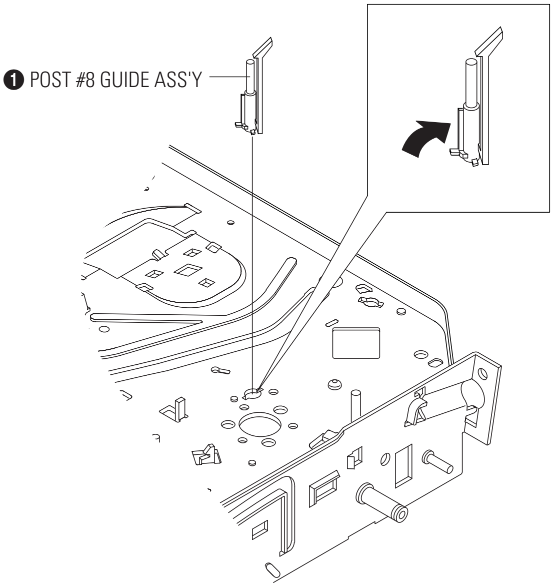


Fig. 5-40 Post #8 Guide Ass'y Removal

5-4-28 Level Head Cleaner Ass'y Removal (Optional)

1) Release the Hook ❶.
2) Lift the Lever Head Cleaner Ass'y ❷.

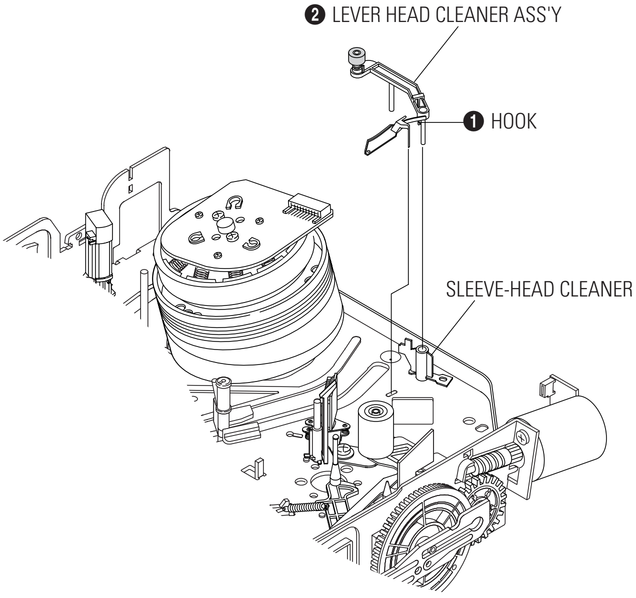


Fig. 5-41 Lever Head Cleaner Ass'y Removal

5-4-29 How to Eject the Cassette Tape (If the unit does not operate on condition that is inserted into housing ass'y)

1) Turn the Gear worm ❶ clockwise with screw driver.(Refer to arrow)
(Other method : Remove the Screw of Motor Load Ass'y, Separate the Motor Load Ass'y)

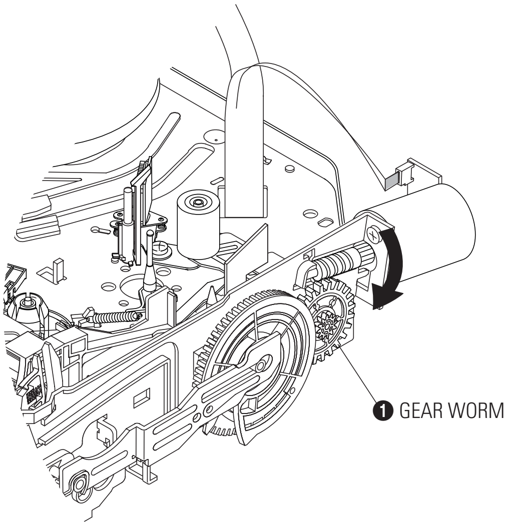


Fig. 5-42

2) When Slider S,T are approched in the position of unloading, rotate holder Clutch counterclockwise after inserting screw driver in the hole of frame's bottom in order to wind the unwinded tape. (Refer to Fig.5-43)
(If you rotate Gear Worm ❶ continuously when tape is in state of unwinding, you may cause a tape contamination by grease and tape damage. Be sure to wind the unwinded tape in the state of set horizently.)
3) Rotate Gear Worm ❶ clockwise using screw driver again up to the state of eject mode and then pick out the tape.(Refer to Fig.5-42)

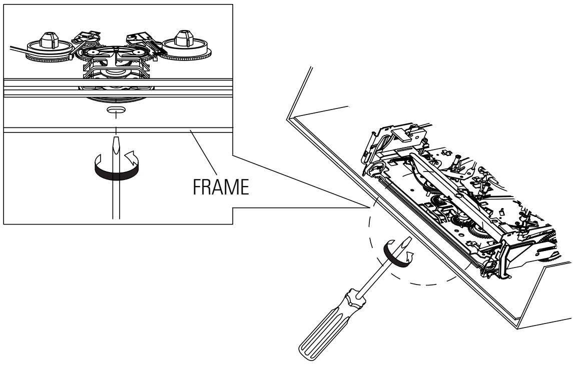


Fig. 5-43

5-5 The table of cleaning, Lubrication and replacement time about principal parts

1) The replacement time of parts is not life of parts.
2) The table 5-1 is that the VCR Set is in normal condition (normal temperature, normal humidity).
The checking period may be changed owing to the condition of use, runtime and environmental conditions.
3) Life of the Cylinder Ass'y is depend on the condition of use.
4) See exploded view for location of each parts.

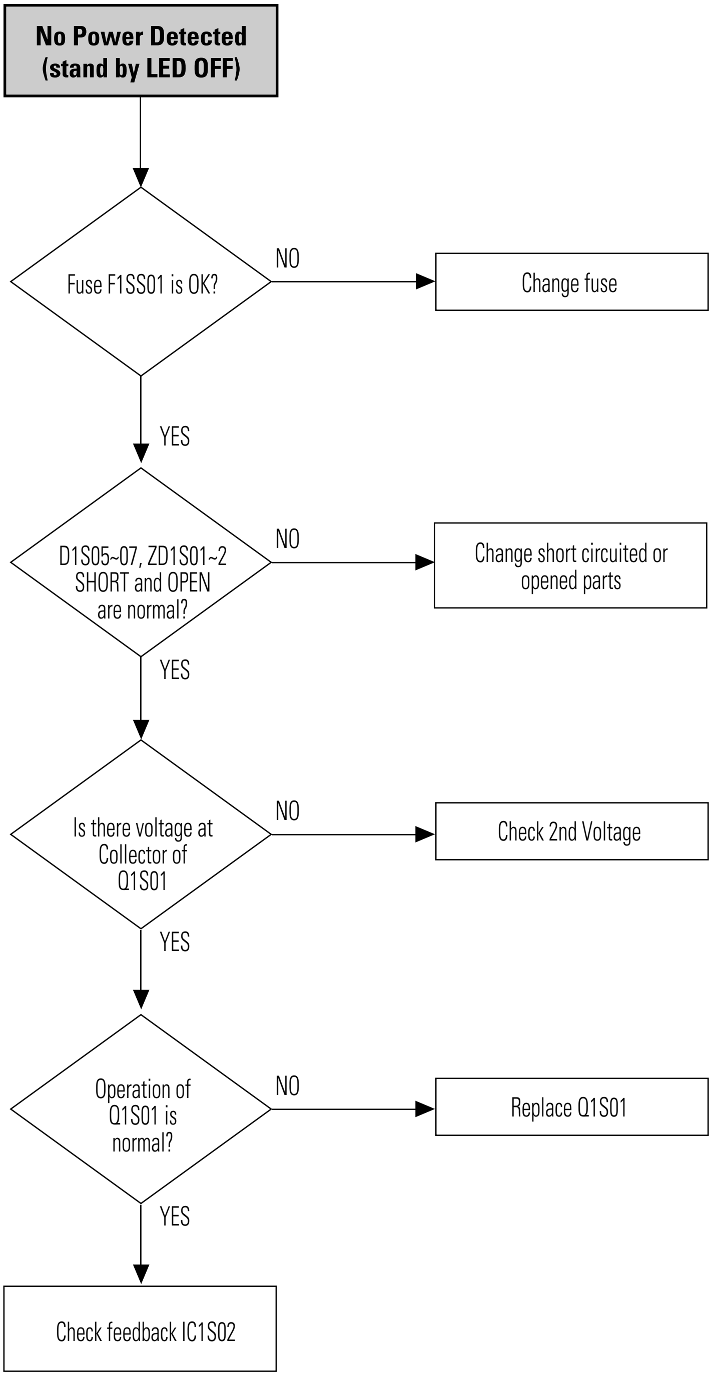
<Table 5-1>

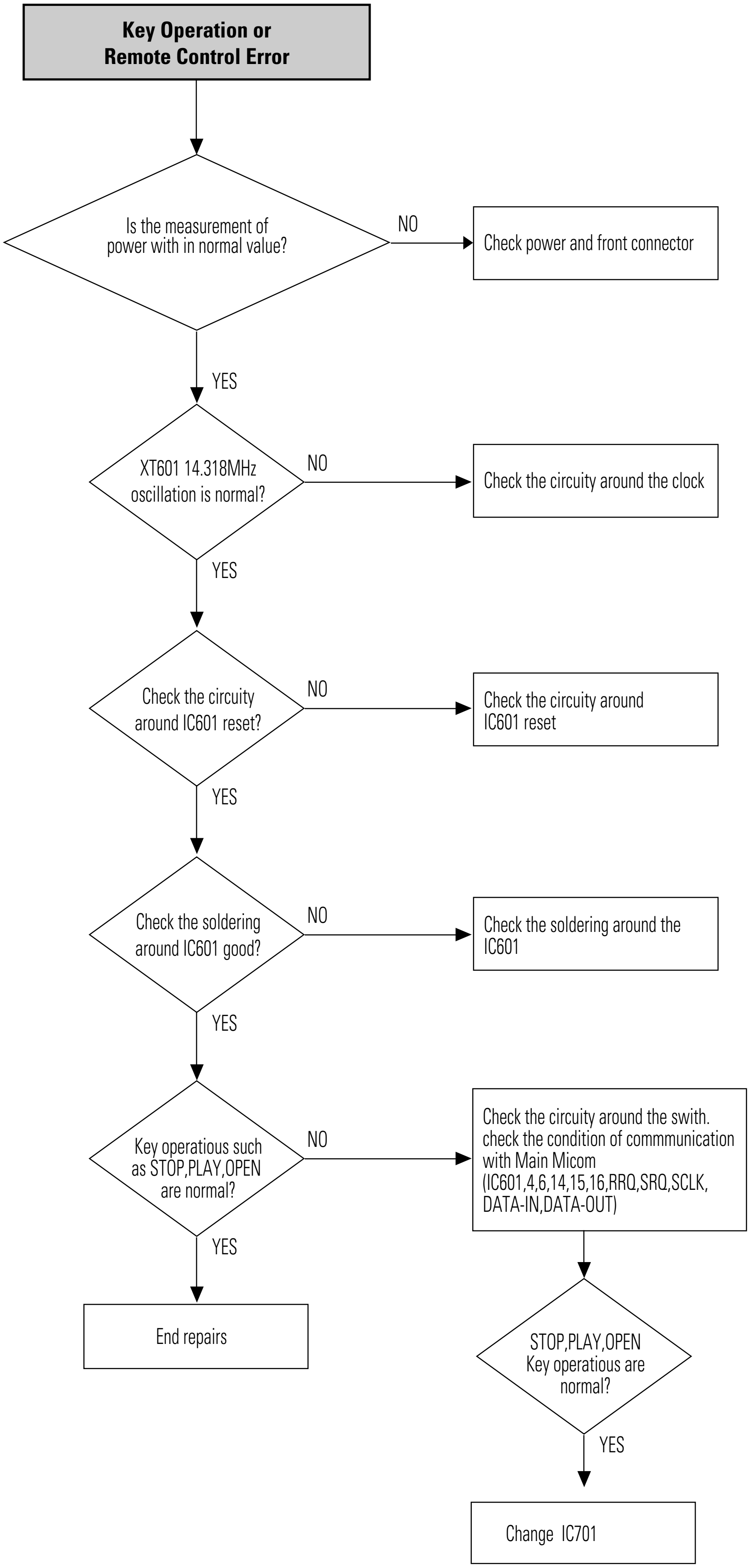
*	Parts Name	Checking Period										Remark
		500	1000	1500	2000	2500	3000	3500	4000	4500	5000	
TAPE PATH SYSTEM	POST TENSION	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	- To clean the parts, use patch and alcohol (solvent). - After cleaning, use the video tape after alcohol is gone away completely. - We recommend to use oil [EP-50] or solvent. - One or two drops of oil should be applied after cleaning with alcohol.
	SLANT POST S, T	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	
	#8 GUIDE SHAFT	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	
	CAPSTAN SHAFT	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	
	#9 GUIDE POST	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	
	#3 GUIDE POST	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	
	GUIDE ROLLER S, T	Δ	Δ	Δ	0	0	0	0	0	0	0	
	CYLINDER ASS'Y	Δ	0	0	0	0	0	0	0	0	0	
	FE HEAD	Δ	Δ	Δ	0	0	0	0	0	0	0	
	ACE HEAD	Δ	0	0	0	0	0	0	0	0	0	
	PINCH ROLLER	Δ	0	0	0	0	0	0	0	0	0	
	POST REEL S, T		◆		◆		◆		◆		◆	- Periodic time of applying oil (Apply oil after cleaning) - The excessive applying oil may be the cause of malfunction.
	SLEEVE TENSION		◆		◆		◆		◆		◆	
	POST CENTER		◆		◆		◆		◆		◆	
	LEVER IDLE BOSS (2Point)		◆		◆		◆		◆		◆	
DRIVING SYSTEM	CAPSTAN MOTOR PULLEY	Δ	Δ	Δ	Δ	Δ	0	0	0	0	0	
	BELT PULLEY				0	0	0	0	0	0	0	
	HOLDER CLUTCH ASS'Y	Δ	0	0	0	0	0	0	0	0	0	
	GEAR CENTER ASS'Y		0	0	0	0	0	0	0	0	0	
	GEAR IDLE (2Point)		0	0	0	0	0	0	0	0	0	
	LOADING MOTOR		0	0	0	0	0	0	0	0	0	
BRAKE SYSTEM	BAND BRAKE ASS'Y		0	0	0	0	0	0	0	0	0	
	BRAKE T ASS'Y		0	0	0	0	0	0	0	0	0	

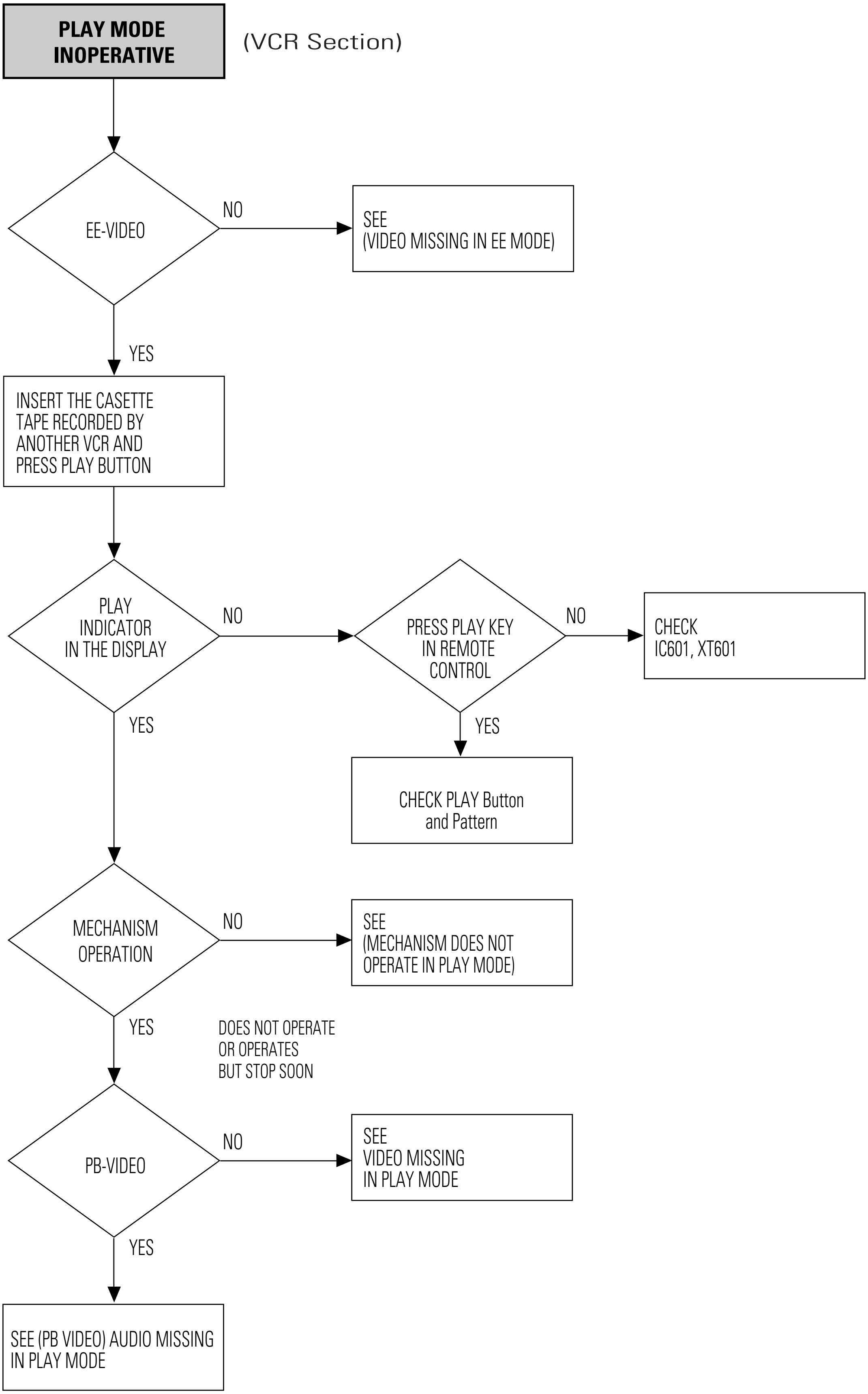
Δ : Cleaning   O : Check and replacement in necessary   ◆ : Add Oil

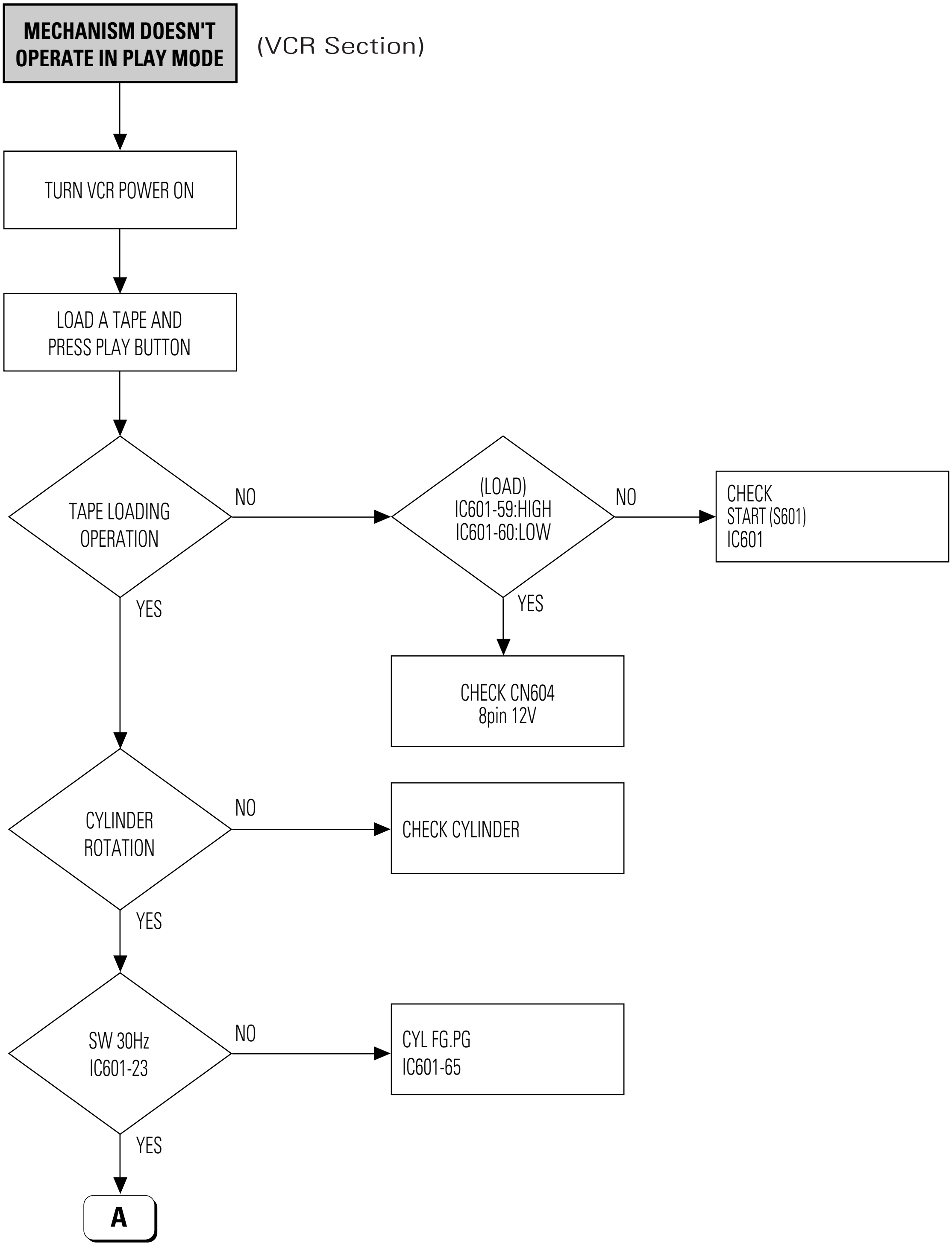
MEMO

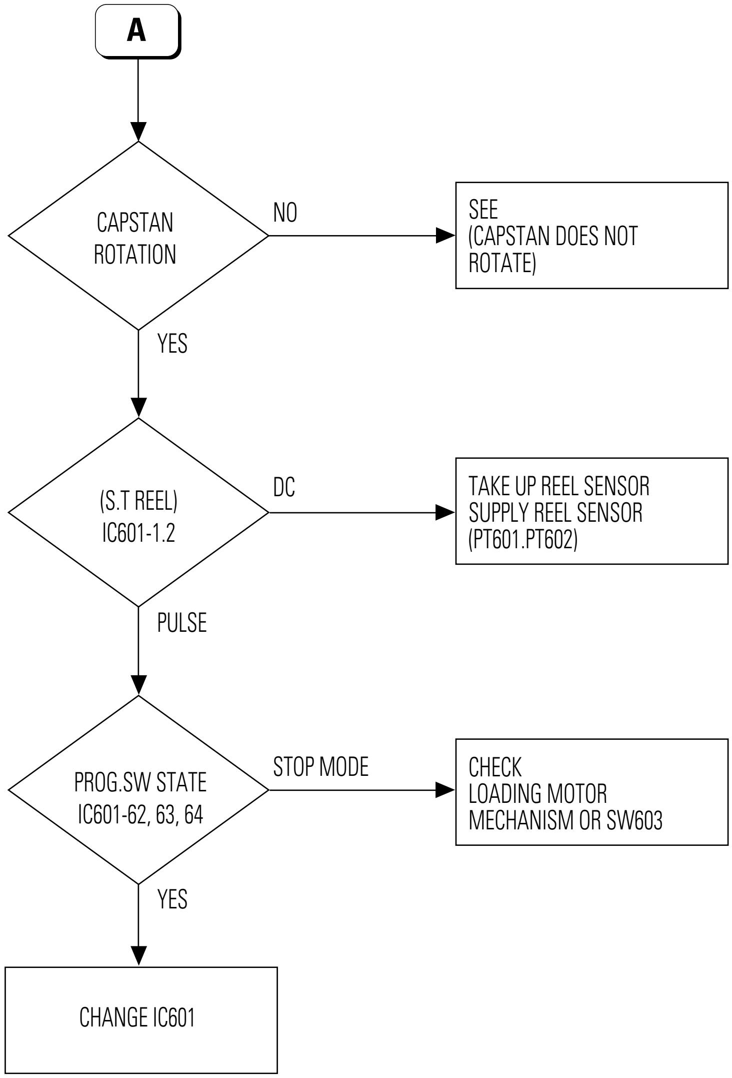
6. Troubleshooting

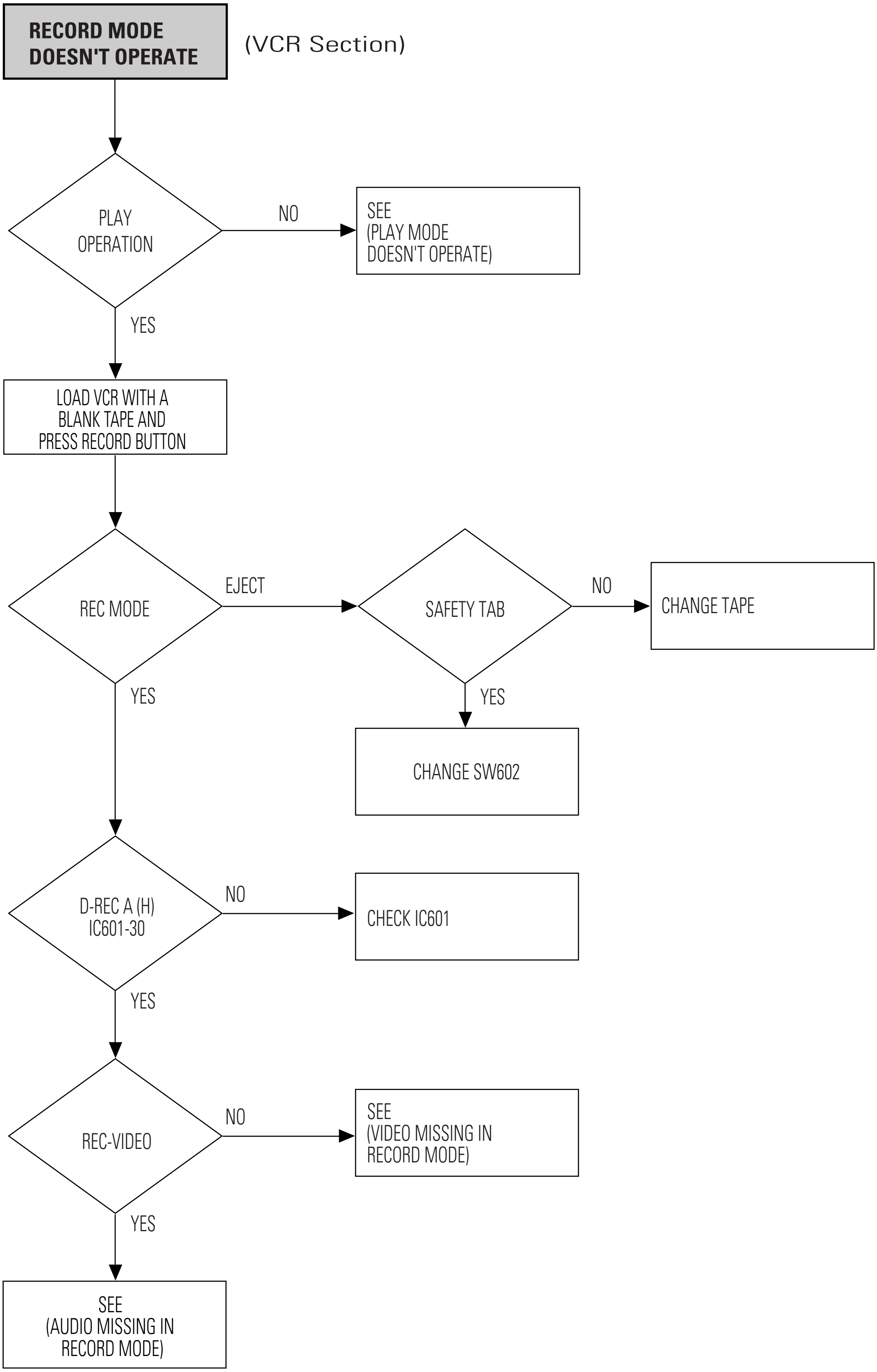

No Power Detected
(stand by LED OFF)
Fuse F1SS01 is OK?
NO
Change fuse
YES
D1S05~07, ZD1S01~2
SHORT and OPEN
are normal?
NO
Change short circuited or
opened parts
YES
Is there voltage at
Collector of
Q1S01
NO
Check 2nd Voltage
YES
Operation of
Q1S01 is
normal?
NO
Replace Q1S01
YES
Check feedback IC1S02

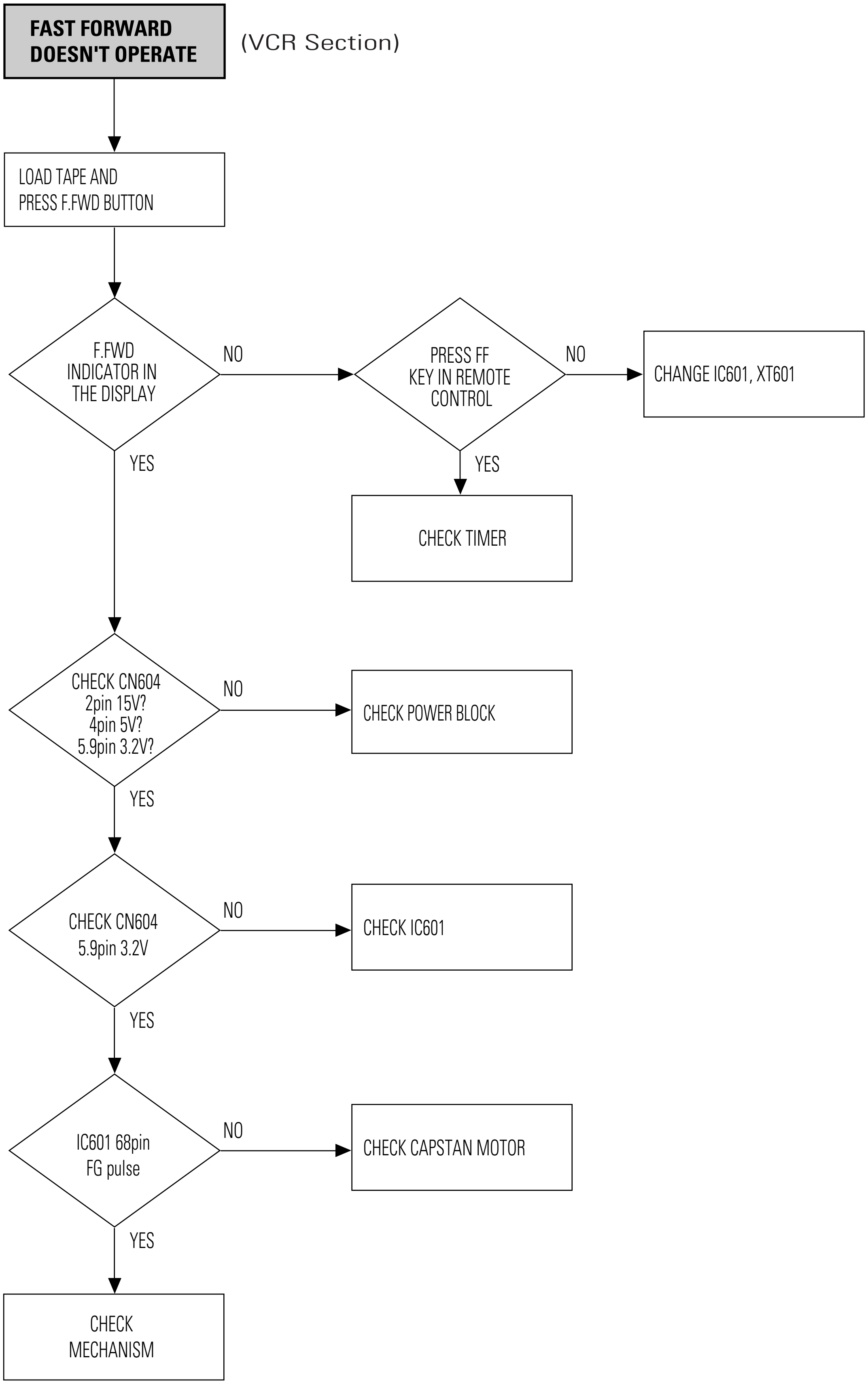

Key Operation or Remote Control Error
Is the measurement of power with in normal value?
NO
Check power and front connector
YES
XT601 14.318MHz oscillation is normal?
NO
Check the circuity around the clock
YES
Check the circuity around IC601 reset?
NO
Check the circuity around IC601 reset
YES
Check the soldering around IC601 good?
NO
Check the soldering around the IC601
YES
Key operatious such as STOP,PLAY,OPEN are normal?
NO
Check the circuity around the swith. check the condition of commmunication with Main Micom (IC601,4,6,14,15,16,RRQ,SRQ,SCLK, DATA-IN,DATA-OUT)
YES
End repairs
STOP,PLAY,OPEN Key operatious are normal?
YES
Change IC701


PLAY MODE INOPERATIVE
(VCR Section)
EE-VIDEO
NO
SEE (VIDEO MISSING IN EE MODE)
YES
INSERT THE CASETTE TAPE RECORDED BY ANOTHER VCR AND PRESS PLAY BUTTON
PLAY INDICATOR IN THE DISPLAY
NO
PRESS PLAY KEY IN REMOTE CONTROL
NO
CHECK IC601, XT601
YES
CHECK PLAY Button and Pattern
YES
MECHANISM OPERATION
NO
SEE (MECHANISM DOES NOT OPERATE IN PLAY MODE)
YES
DOES NOT OPERATE OR OPERATES BUT STOP SOON
PB-VIDEO
NO
SEE VIDEO MISSING IN PLAY MODE
YES
SEE (PB VIDEO) AUDIO MISSING IN PLAY MODE

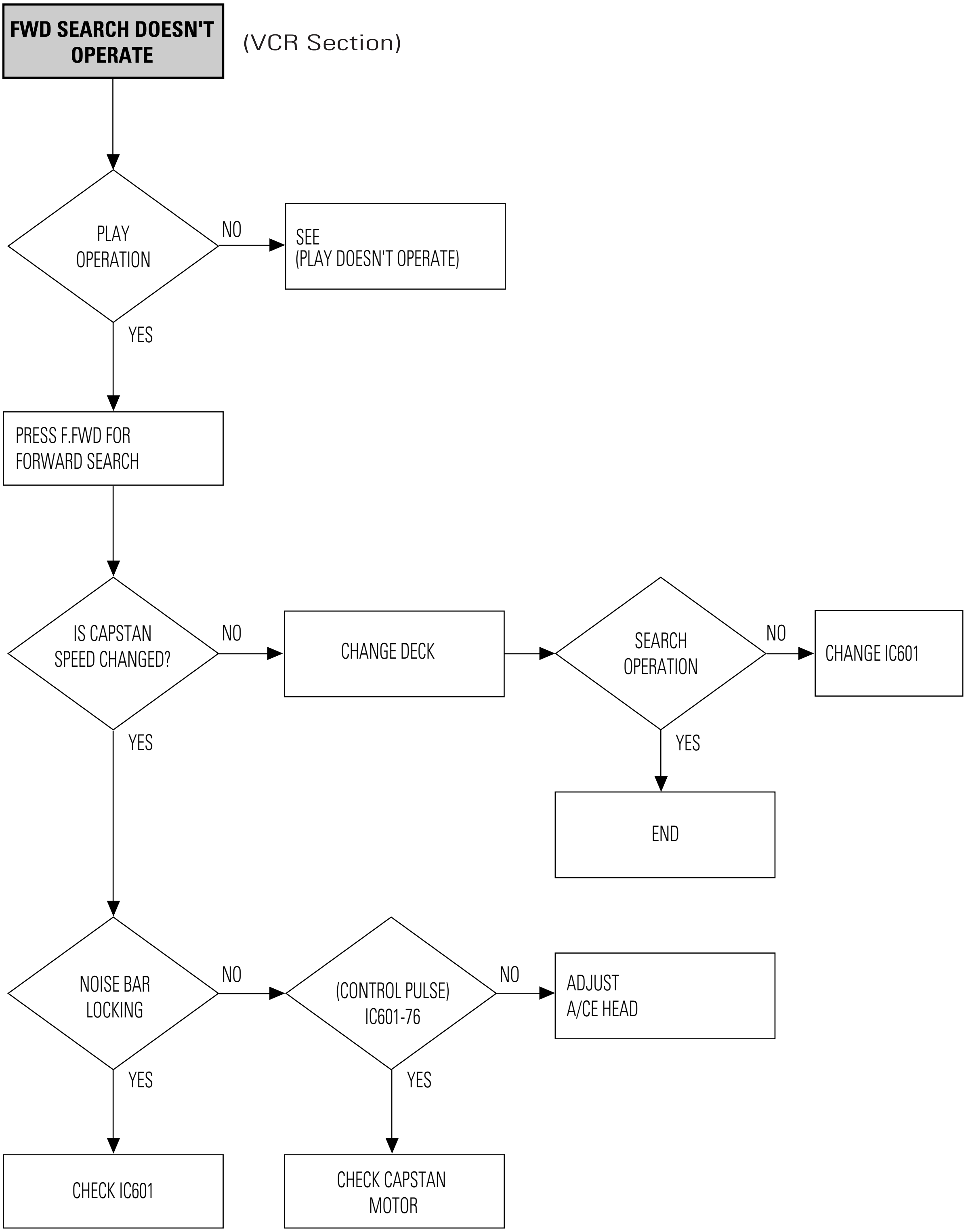

MECHANISM DOESN'T OPERATE IN PLAY MODE
(VCR Section)
TURN VCR POWER ON
LOAD A TAPE AND PRESS PLAY BUTTON
TAPE LOADING OPERATION
NO
(LOAD) IC601-59:HIGH IC601-60:LOW
NO
CHECK START (S601) IC601
YES
CHECK CN604 8pin 12V
YES
CYLINDER ROTATION
NO
CHECK CYLINDER
YES
SW 30Hz IC601-23
NO
CYL FG.PG IC601-65
YES
A

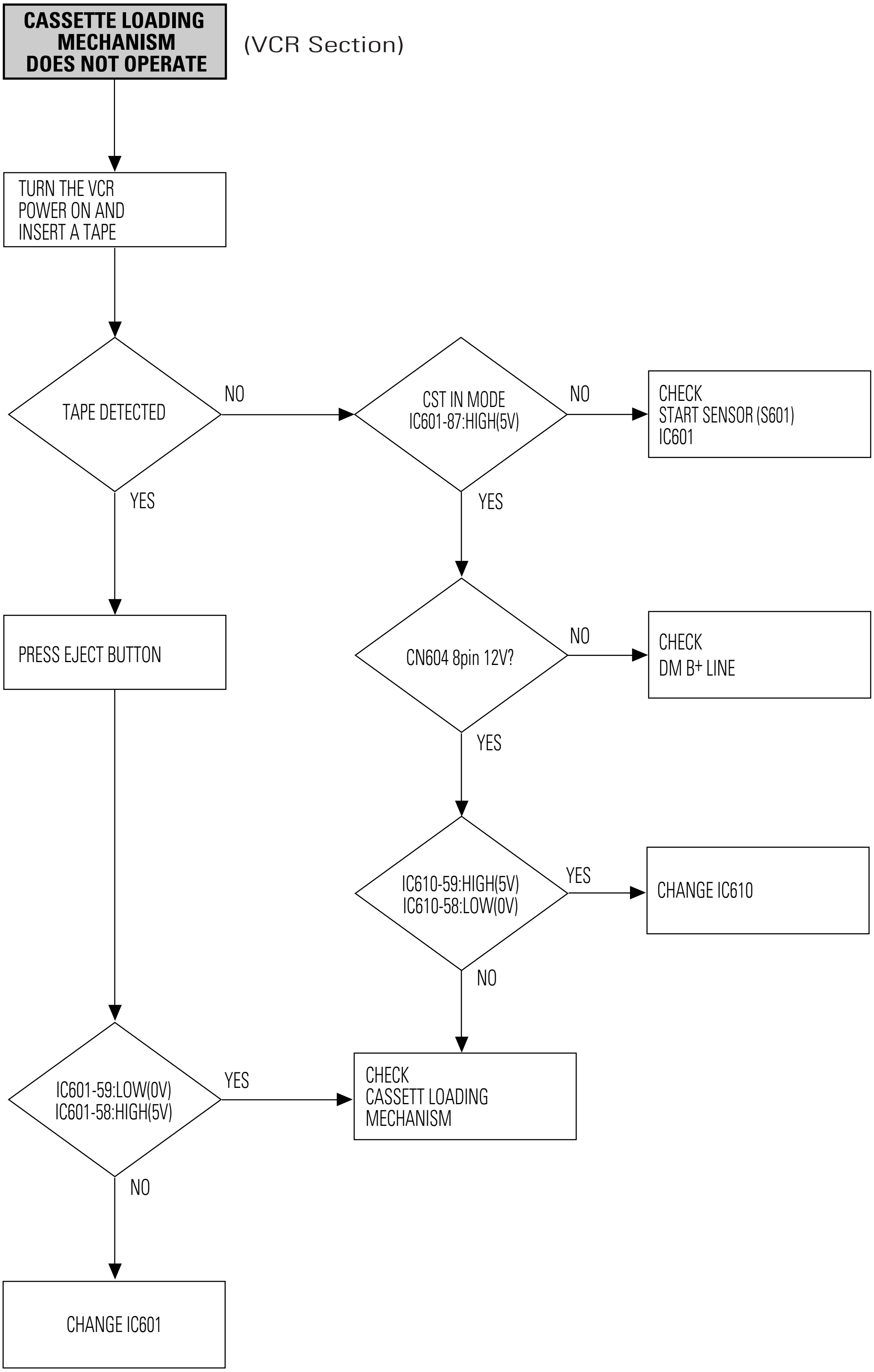

A
CAPSTAN ROTATION
NO
SEE (CAPSTAN DOES NOT ROTATE)
YES
(S.T REEL) IC601-1.2
DC
TAKE UP REEL SENSOR
SUPPLY REEL SENSOR
(PT601.PT602)
PULSE
PROG.SW STATE IC601-62, 63, 64
STOP MODE
CHECK
LOADING MOTOR
MECHANISM OR SW603
YES
CHANGE IC601

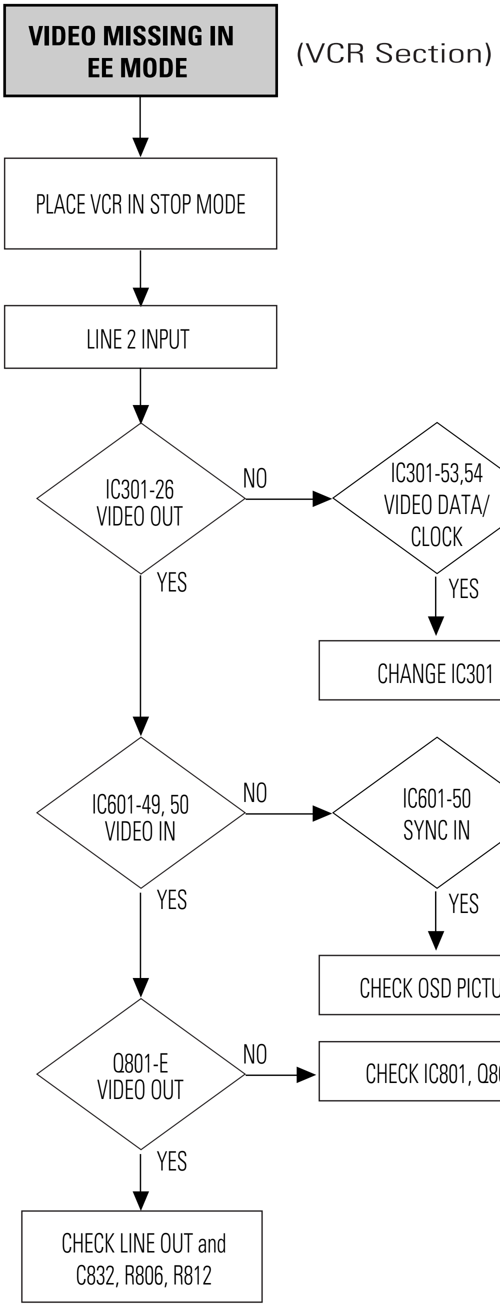

RECORD MODE
DOESN'T OPERATE
(VCR Section)
PLAY
OPERATION
NO
SEE
(PLAY MODE
DOESN'T OPERATE)
YES
LOAD VCR WITH A
BLANK TAPE AND
PRESS RECORD BUTTON
REC MODE
EJECT
SAFETY TAB
NO
CHANGE TAPE
YES
YES
CHANGE SW602
D-REC A (H)
IC601-30
NO
CHECK IC601
YES
REC-VIDEO
NO
SEE
(VIDEO MISSING IN
RECORD MODE)
YES
SEE
(AUDIO MISSING IN
RECORD MODE)

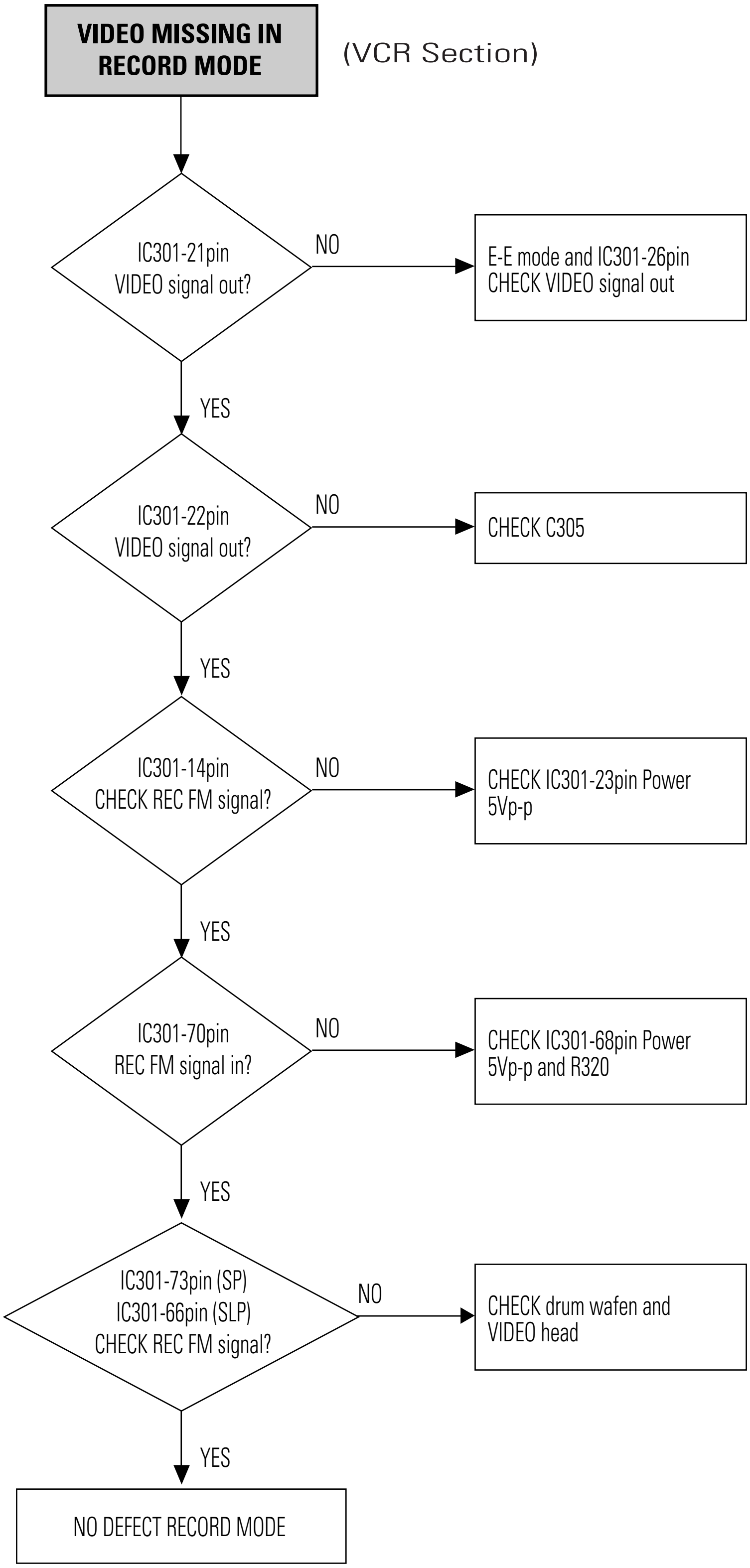

FAST FORWARD DOESN'T OPERATE
LOAD TAPE AND PRESS F.FWD BUTTON
F.FWD INDICATOR IN THE DISPLAY
NO
PRESS FF KEY IN REMOTE CONTROL
NO
CHANGE IC601, XT601
YES
CHECK TIMER
YES
CHECK CN604 2pin 15V? 4pin 5V? 5.9pin 3.2V?
NO
CHECK POWER BLOCK
YES
CHECK CN604 5.9pin 3.2V
NO
CHECK IC601
YES
IC601 68pin FG pulse
NO
CHECK CAPSTAN MOTOR
YES
CHECK MECHANISM

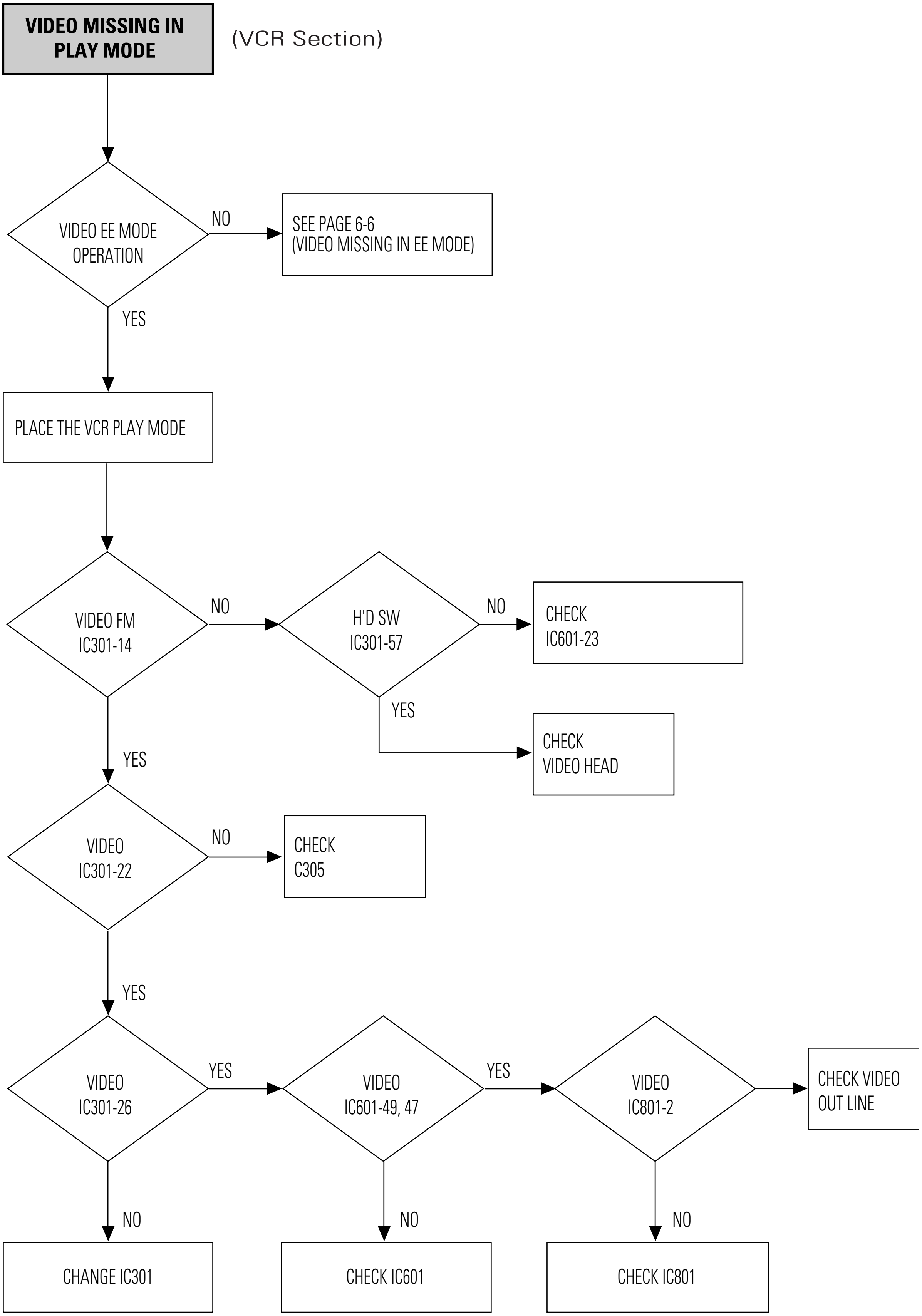
(VCR Section)

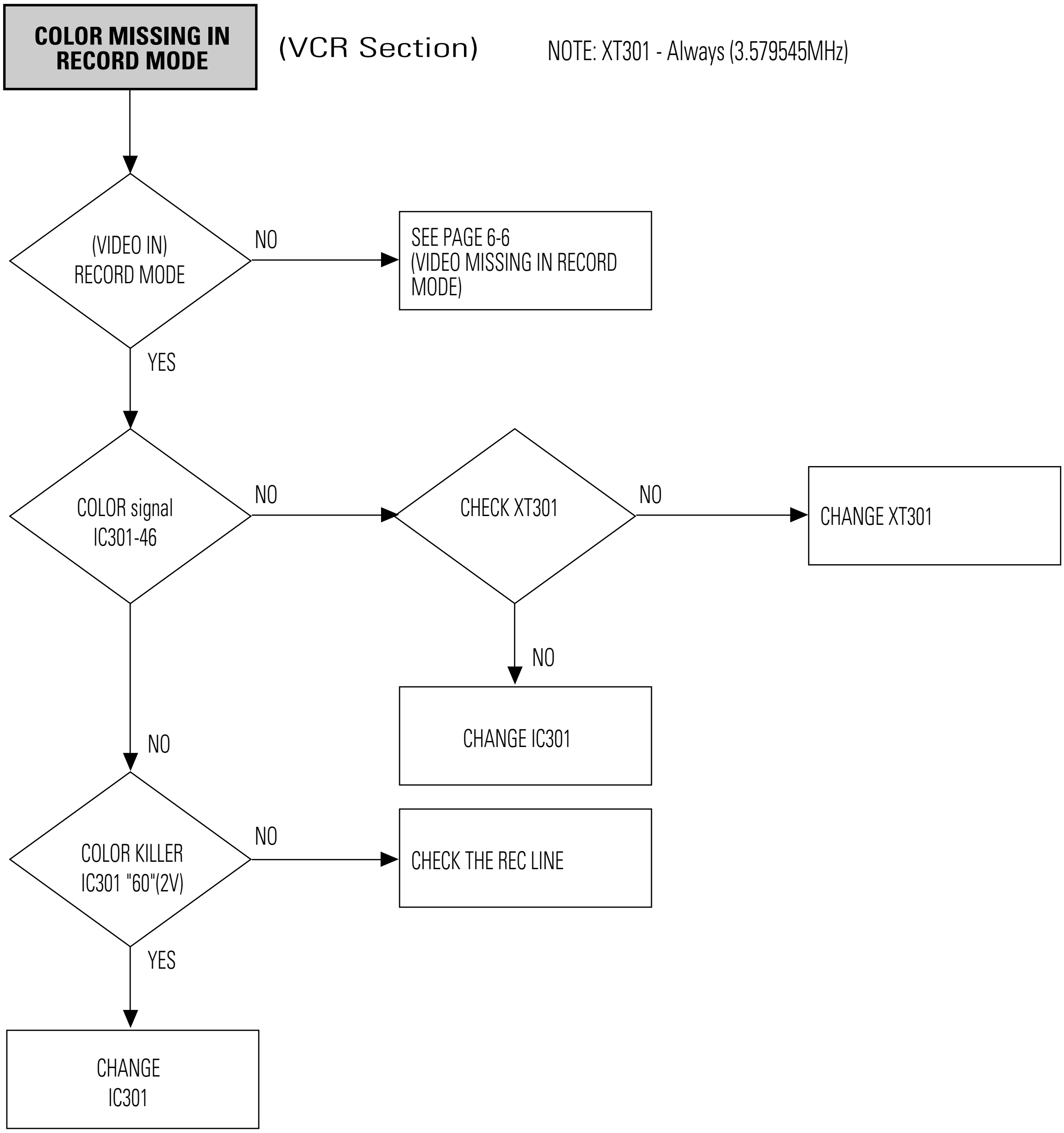

FWD SEARCH DOESN'T OPERATE
(VCR Section)
PLAY OPERATION
NO
SEE (PLAY DOESN'T OPERATE)
YES
PRESS F.FWD FOR FORWARD SEARCH
IS CAPSTAN SPEED CHANGED?
NO
CHANGE DECK
SEARCH OPERATION
NO
CHANGE IC601
YES
END
YES
NOISE BAR LOCKING
NO
(CONTROL PULSE) IC601-76
NO
ADJUST A/CE HEAD
YES
CHECK IC601
YES
CHECK CAPSTAN MOTOR


CASSETTE LOADING MECHANISM DOES NOT OPERATE
(VCR Section)
TURN THE VCR POWER ON AND INSERT A TAPE
TAPE DETECTED
NO
CST IN MODE IC601-87:HIGH(5V)
NO
CHECK START SENSOR (S601) IC601
YES
YES
PRESS EJECT BUTTON
CN604 8pin 12V?
NO
CHECK DM B+ LINE
YES
IC610-59:HIGH(5V) IC610-58:LOW(0V)
YES
CHANGE IC610
NO
IC601-59:LOW(0V) IC601-58:HIGH(5V)
YES
CHECK CASSETT LOADING MECHANISM
NO
CHANGE IC601


VIDEO MISSING IN EE MODE
(VCR Section)
PLACE VCR IN STOP MODE
LINE 2 INPUT
IC301-26 VIDEO OUT
NO
IC301-53,54 VIDEO DATA/ CLOCK
NO
CHECK IC601
YES
YES
CHANGE IC301
IC601-49, 50 VIDEO IN
NO
IC601-50 SYNC IN
NO
CHECK R638, C626, C622
YES
YES
CHECK OSD PICTURE
Q801-E VIDEO OUT
NO
CHECK IC801, Q801
YES
CHECK LINE OUT and C832, R806, R812

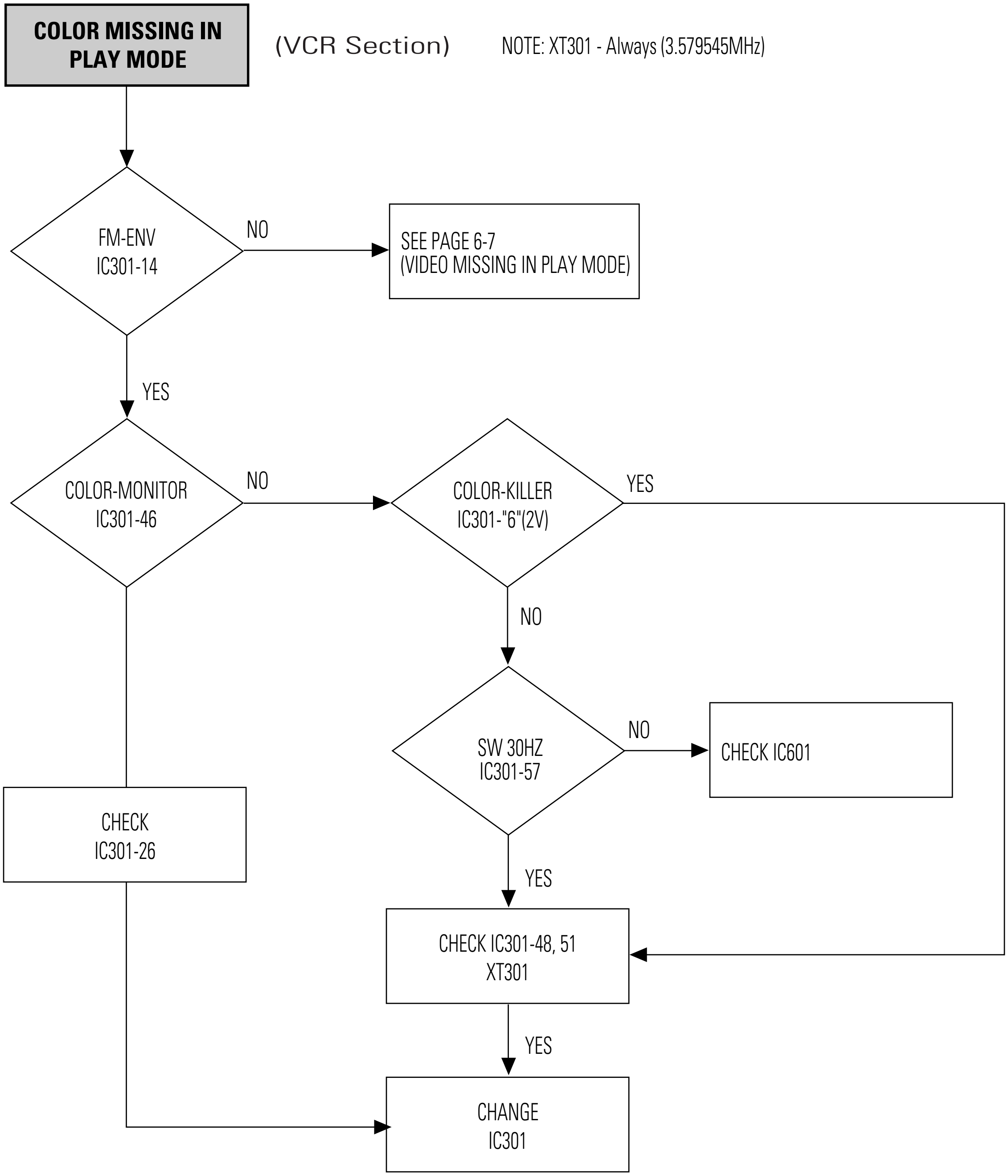

VIDEO MISSING IN RECORD MODE
(VCR Section)
IC301-21pin VIDEO signal out?
NO
E-E mode and IC301-26pin CHECK VIDEO signal out
YES
IC301-22pin VIDEO signal out?
NO
CHECK C305
YES
IC301-14pin CHECK REC FM signal?
NO
CHECK IC301-23pin Power 5Vp-p
YES
IC301-70pin REC FM signal in?
NO
CHECK IC301-68pin Power 5Vp-p and R320
YES
IC301-73pin (SP) IC301-66pin (SLP) CHECK REC FM signal?
NO
CHECK drum wafen and VIDEO head
YES
NO DEFECT RECORD MODE


VIDEO MISSING IN PLAY MODE
(VCR Section)
VIDEO EE MODE OPERATION
NO
SEE PAGE 6-6 (VIDEO MISSING IN EE MODE)
YES
PLACE THE VCR PLAY MODE
VIDEO FM IC301-14
NO
H'D SW IC301-57
NO
CHECK IC601-23
YES
CHECK VIDEO HEAD
YES
VIDEO IC301-22
NO
CHECK C305
YES
VIDEO IC301-26
YES
VIDEO IC601-49, 47
YES
VIDEO IC801-2
CHECK VIDEO OUT LINE
NO
NO
NO
CHANGE IC301
CHECK IC601
CHECK IC801


COLOR MISSING IN RECORD MODE
(VIDEO IN) RECORD MODE
NO
SEE PAGE 6-6 (VIDEO MISSING IN RECORD MODE)
YES
COLOR signal IC301-46
NO
CHECK XT301
NO
CHANGE XT301
NO
CHANGE IC301
NO
COLOR KILLER IC301 "60"(2V)
NO
CHECK THE REC LINE
YES
CHANGE IC301

(VCR Section)

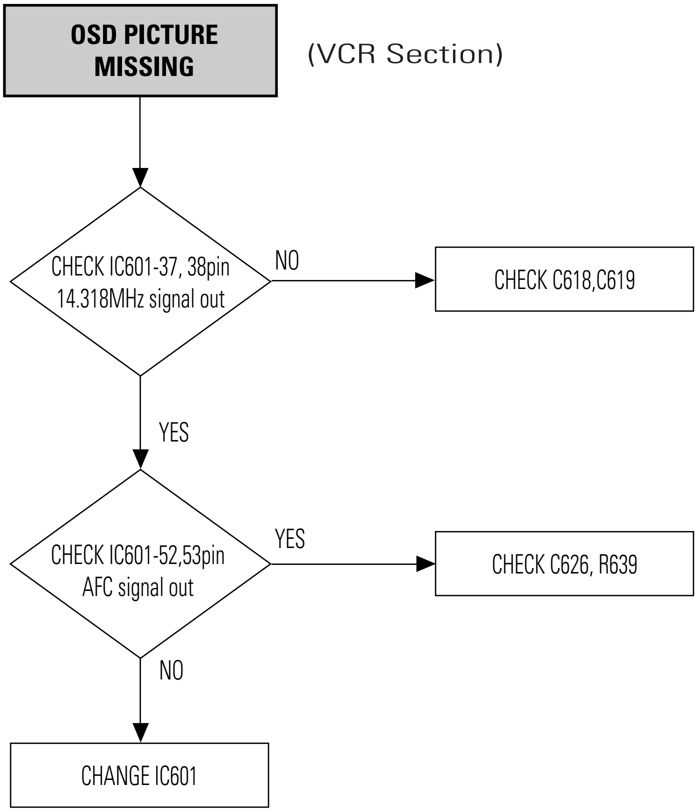
NOTE: XT301 - Always (3.579545MHz)

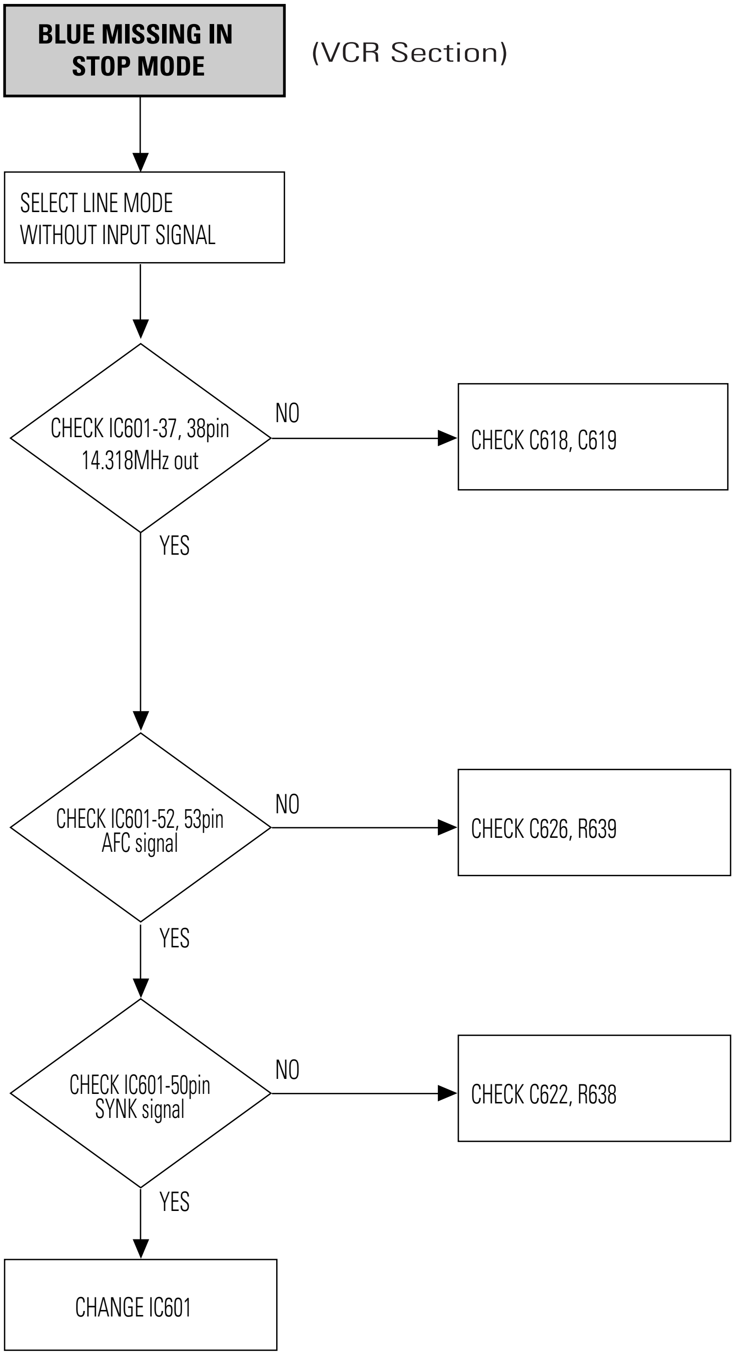


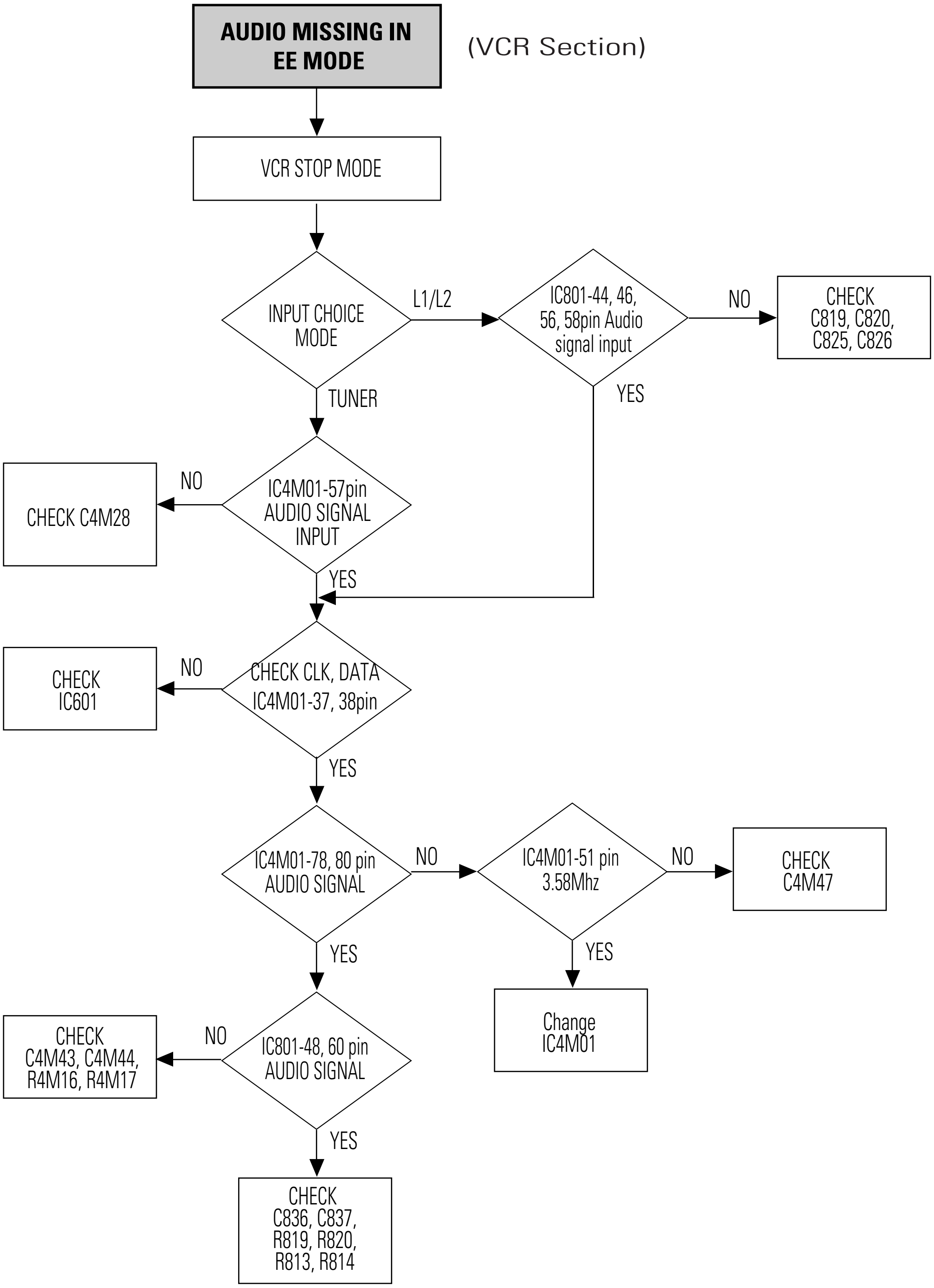
(VCR Section)

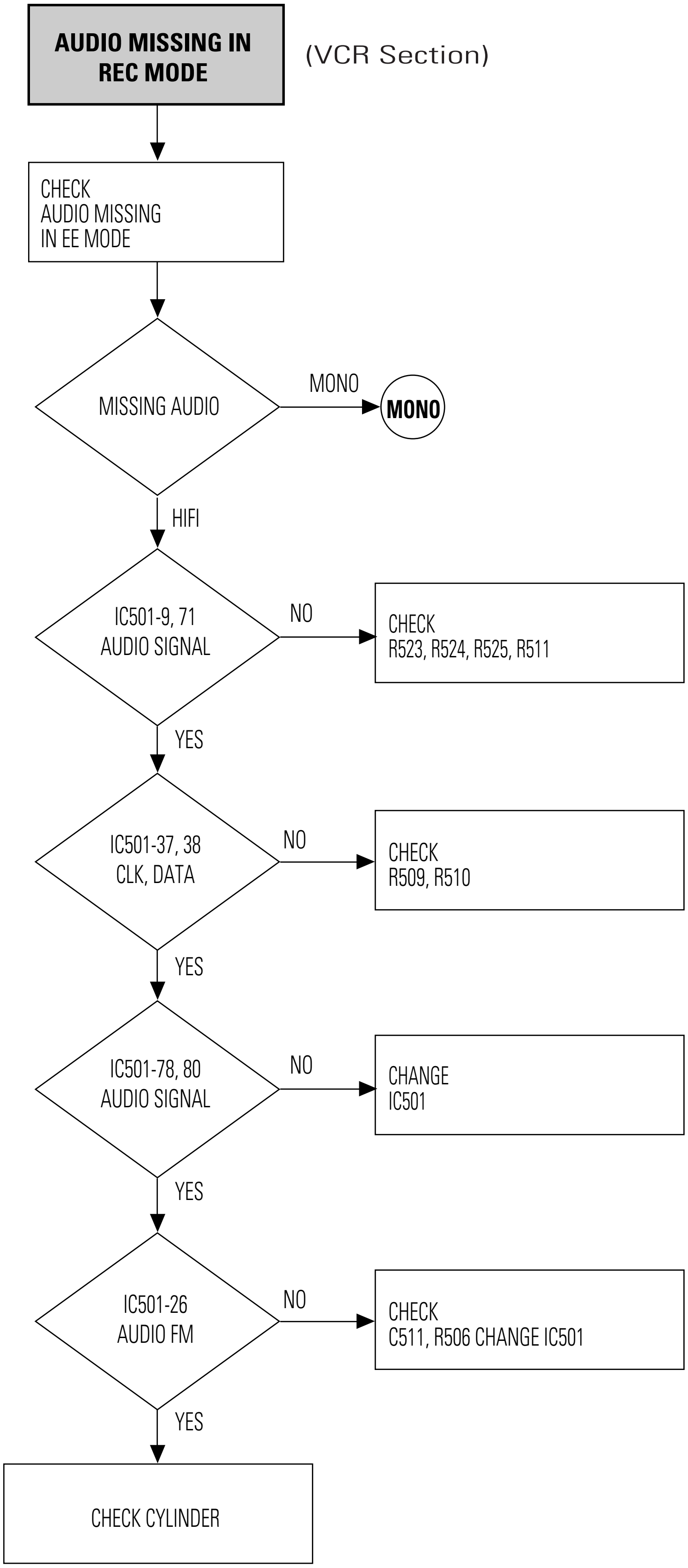
NOTE: XT301 - Always (3.579545MHz)

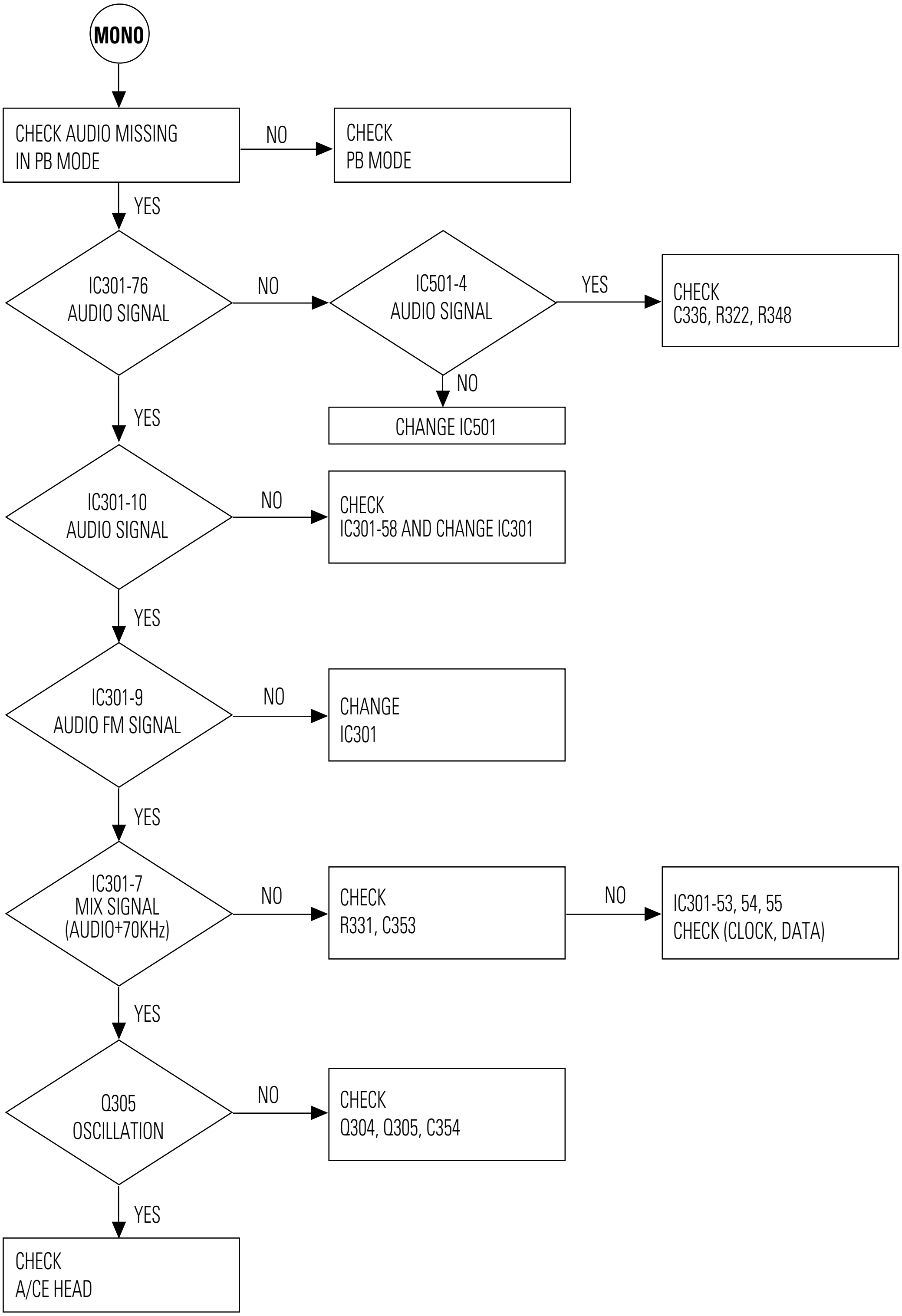
COLOR MISSING IN PLAY MODE
FM-ENV IC301-14
NO
SEE PAGE 6-7 (VIDEO MISSING IN PLAY MODE)
YES
COLOR-MONITOR IC301-46
NO
COLOR-KILLER IC301-"6"(2V)
YES
NO
SW 30HZ IC301-57
NO
CHECK IC601
CHECK IC301-26
YES
CHECK IC301-48, 51 XT301
YES
CHANGE IC301

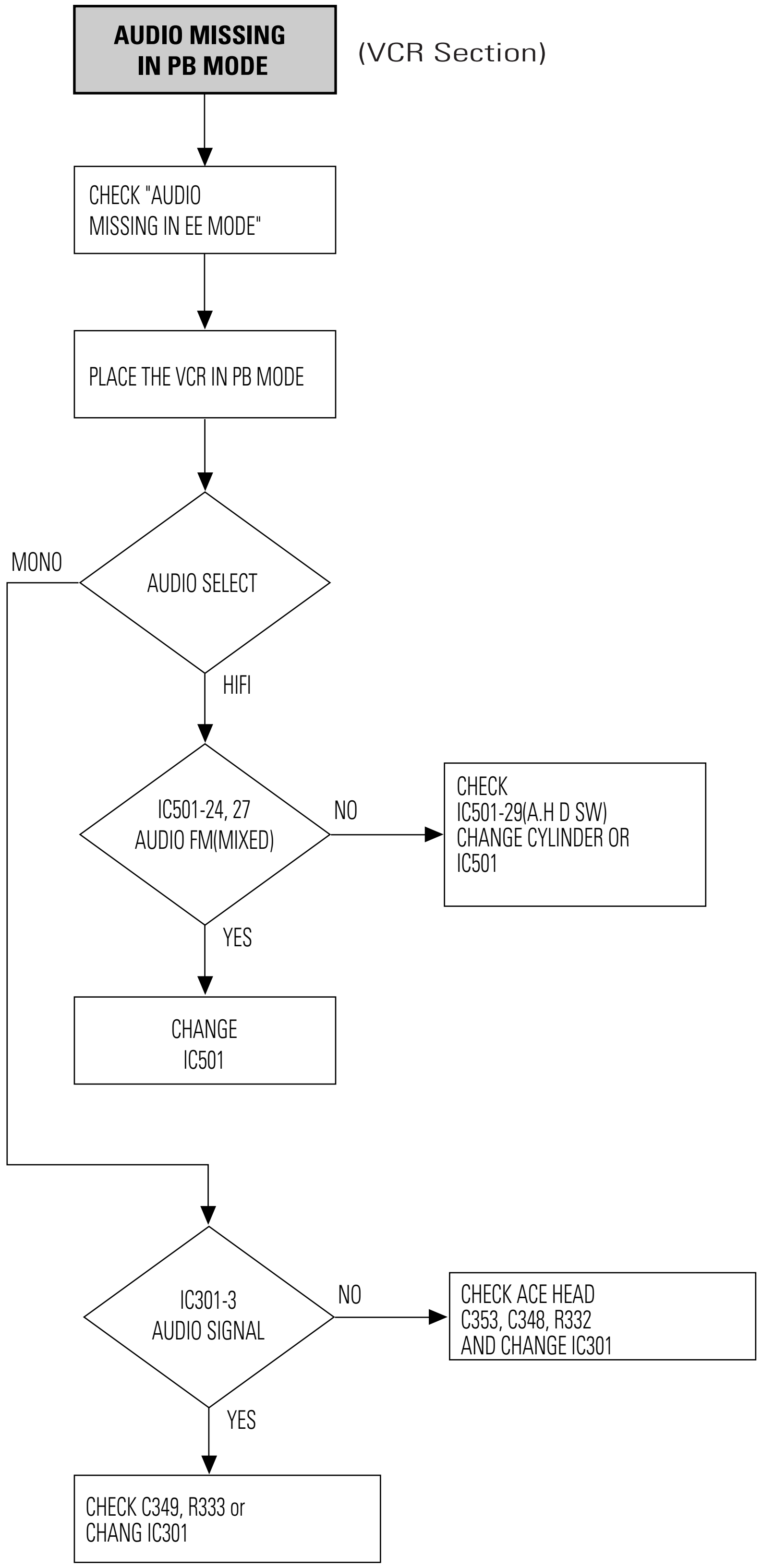

OSD PICTURE MISSING
(VCR Section)
CHECK IC601-37, 38pin
14.318MHz signal out
NO
CHECK C618,C619
YES
CHECK IC601-52,53pin
AFC signal out
YES
CHECK C626, R639
NO
CHANGE IC601

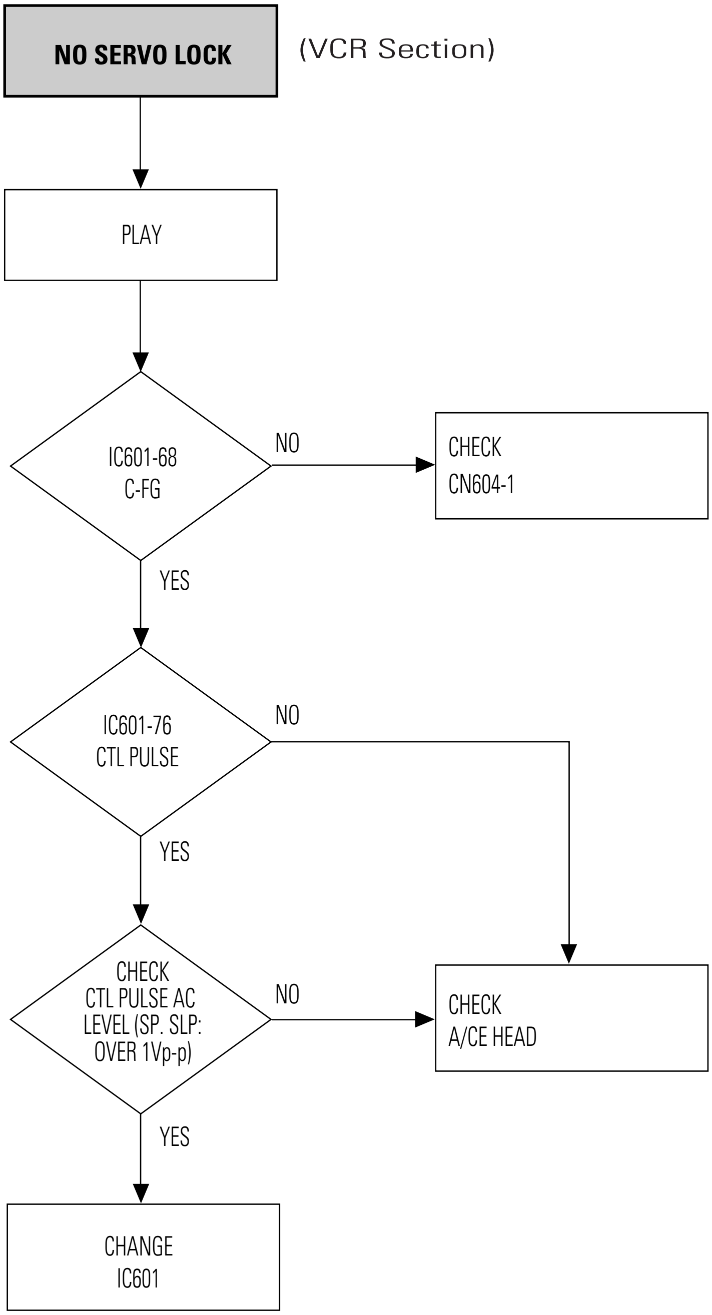

BLUE MISSING IN STOP MODE
(VCR Section)
SELECT LINE MODE WITHOUT INPUT SIGNAL
CHECK IC601-37, 38pin 14.318MHz out
NO
CHECK C618, C619
YES
CHECK IC601-52, 53pin AFC signal
NO
CHECK C626, R639
YES
CHECK IC601-50pin SYNK signal
NO
CHECK C622, R638
YES
CHANGE IC601

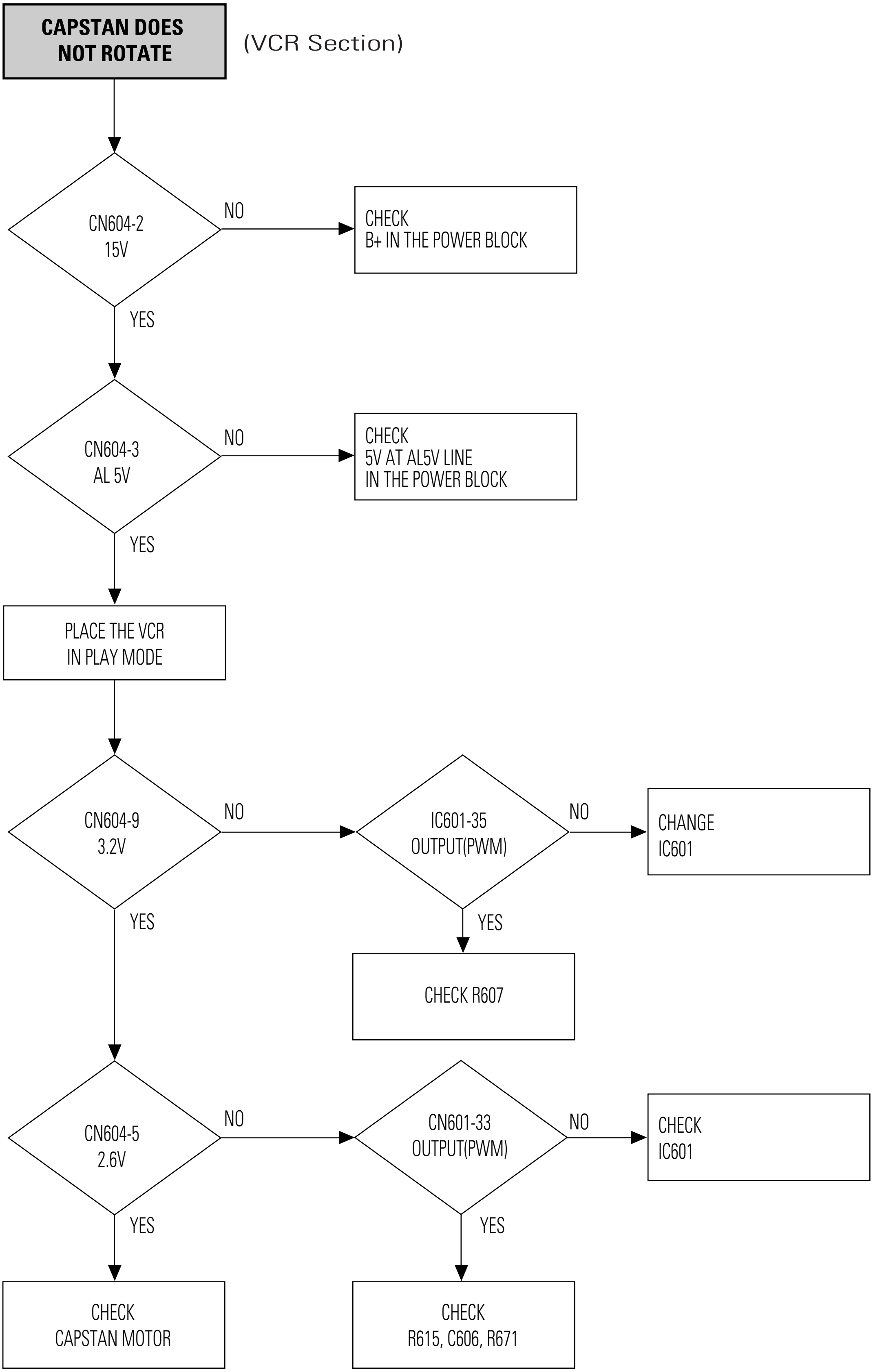

AUDIO MISSING IN EE MODE
(VCR Section)
VCR STOP MODE
INPUT CHOICE MODE
L1/L2
IC801-44, 46, 56, 58pin Audio signal input
NO
CHECK C819, C820, C825, C826
YES
TUNER
IC4M01-57pin AUDIO SIGNAL INPUT
NO
CHECK C4M28
YES
CHECK CLK, DATA IC4M01-37, 38pin
NO
CHECK IC601
YES
IC4M01-78, 80 pin AUDIO SIGNAL
NO
IC4M01-51 pin 3.58Mhz
NO
CHECK C4M47
YES
Change IC4M01
YES
IC801-48, 60 pin AUDIO SIGNAL
NO
CHECK C4M43, C4M44, R4M16, R4M17
YES
CHECK C836, C837, R819, R820, R813, R814

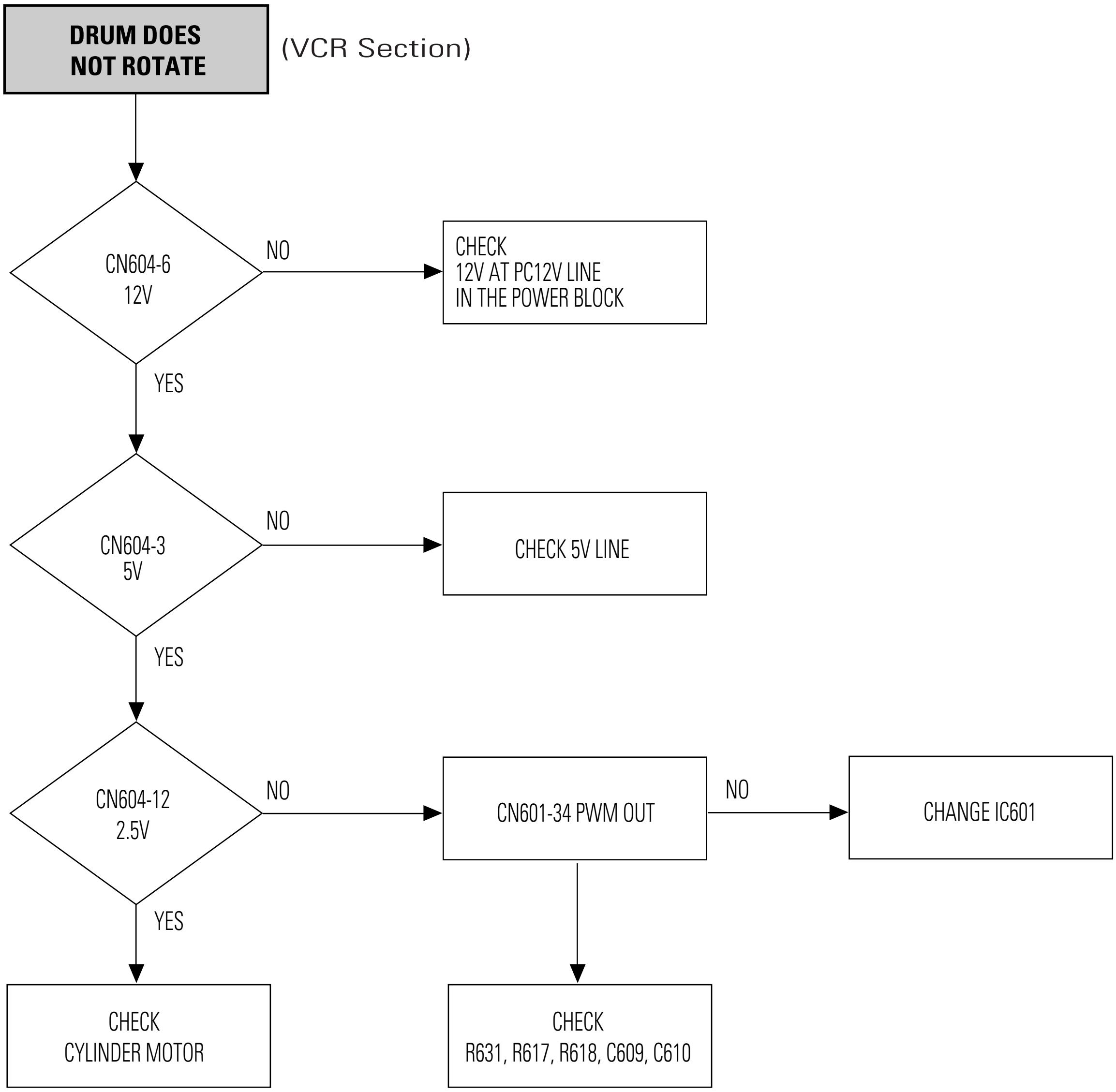

AUDIO MISSING IN REC MODE
(VCR Section)
CHECK AUDIO MISSING IN EE MODE
MISSING AUDIO
MONO
MONO
HIFI
IC501-9, 71 AUDIO SIGNAL
NO
CHECK R523, R524, R525, R511
YES
IC501-37, 38 CLK, DATA
NO
CHECK R509, R510
YES
IC501-78, 80 AUDIO SIGNAL
NO
CHANGE IC501
YES
IC501-26 AUDIO FM
NO
CHECK C511, R506 CHANGE IC501
YES
CHECK CYLINDER


MONO
CHECK AUDIO MISSING IN PB MODE
NO
CHECK PB MODE
YES
IC301-76 AUDIO SIGNAL
NO
IC501-4 AUDIO SIGNAL
YES
CHECK C336, R322, R348
NO
CHANGE IC501
YES
IC301-10 AUDIO SIGNAL
NO
CHECK IC301-58 AND CHANGE IC301
YES
IC301-9 AUDIO FM SIGNAL
NO
CHANGE IC301
YES
IC301-7 MIX SIGNAL (AUDIO+70KHz)
NO
CHECK R331, C353
NO
IC301-53, 54, 55 CHECK (CLOCK, DATA)
YES
Q305 OSCILLATION
NO
CHECK Q304, Q305, C354
YES
CHECK A/CE HEAD

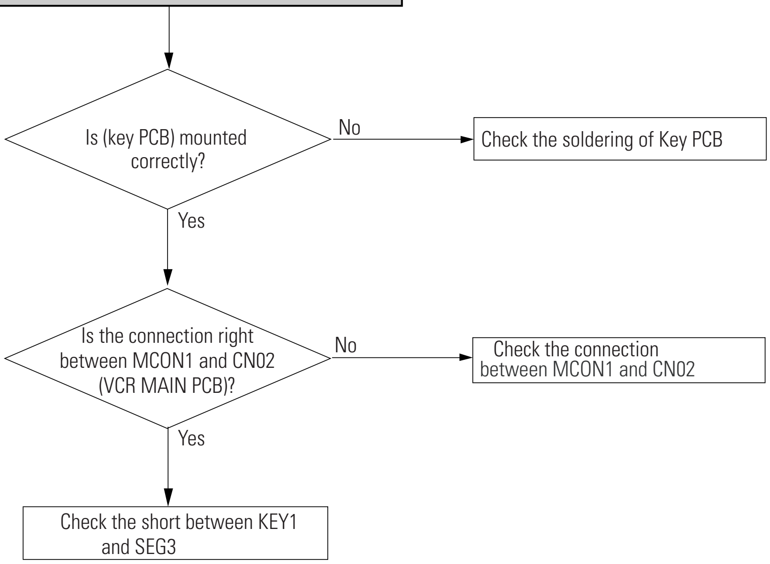

AUDIO MISSING IN PB MODE
(VCR Section)
CHECK "AUDIO MISSING IN EE MODE"
PLACE THE VCR IN PB MODE
AUDIO SELECT
MONO
HIFI
IC501-24, 27 AUDIO FM(MIXED)
NO
CHECK IC501-29(A.H D SW) CHANGE CYLINDER OR IC501
YES
CHANGE IC501
IC301-3 AUDIO SIGNAL
NO
CHECK ACE HEAD C353, C348, R332 AND CHANGE IC301
YES
CHECK C349, R333 or CHANG IC301

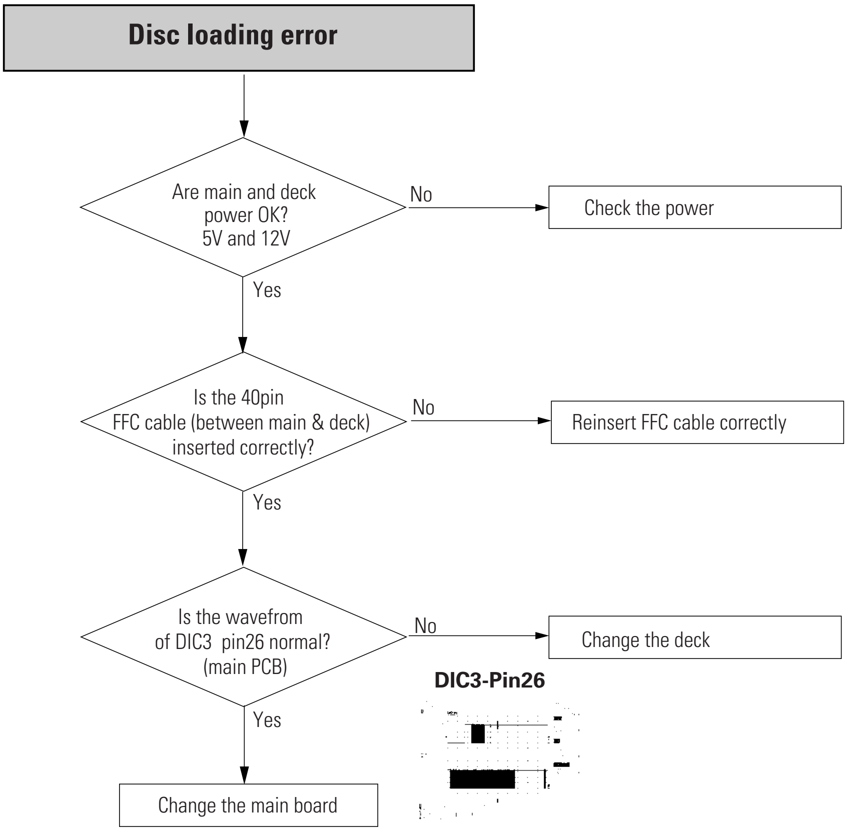

NO SERVO LOCK
(VCR Section)
PLAY
IC601-68
C-FG
NO
CHECK
CN604-1
YES
IC601-76
CTL PULSE
NO
YES
CHECK
CTL PULSE AC
LEVEL (SP. SLP:
OVER 1Vp-p)
NO
CHECK
A/CE HEAD
YES
CHANGE
IC601

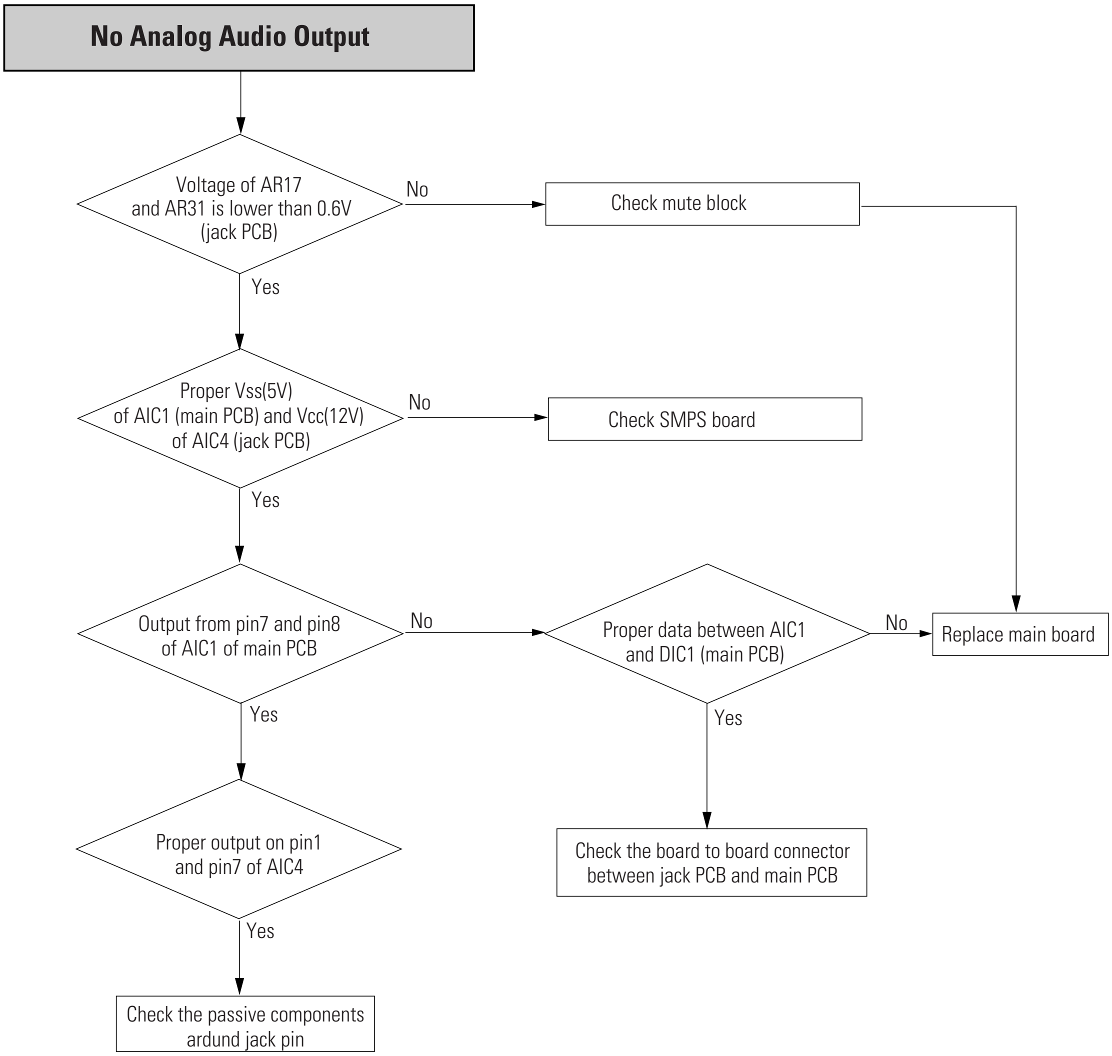

CAPSTAN DOES
NOT ROTATE
(VCR Section)
CN604-2
15V
NO
CHECK
B+ IN THE POWER BLOCK
YES
CN604-3
AL 5V
NO
CHECK
5V AT AL5V LINE
IN THE POWER BLOCK
YES
PLACE THE VCR
IN PLAY MODE
CN604-9
3.2V
NO
IC601-35
OUTPUT(PWM)
NO
CHANGE
IC601
YES
CHECK R607
YES
CN604-5
2.6V
NO
CN601-33
OUTPUT(PWM)
NO
CHECK
IC601
YES
CHECK
CAPSTAN MOTOR
YES
CHECK
R615, C606, R671


DRUM DOES NOT ROTATE
(VCR Section)
CN604-6
12V
NO
CHECK
12V AT PC12V LINE
IN THE POWER BLOCK
YES
CN604-3
5V
NO
CHECK 5V LINE
YES
CN604-12
2.5V
NO
CN601-34 PWM OUT
NO
CHANGE IC601
YES
CHECK
CYLINDER MOTOR
CHECK
R631, R617, R618, C609, C610

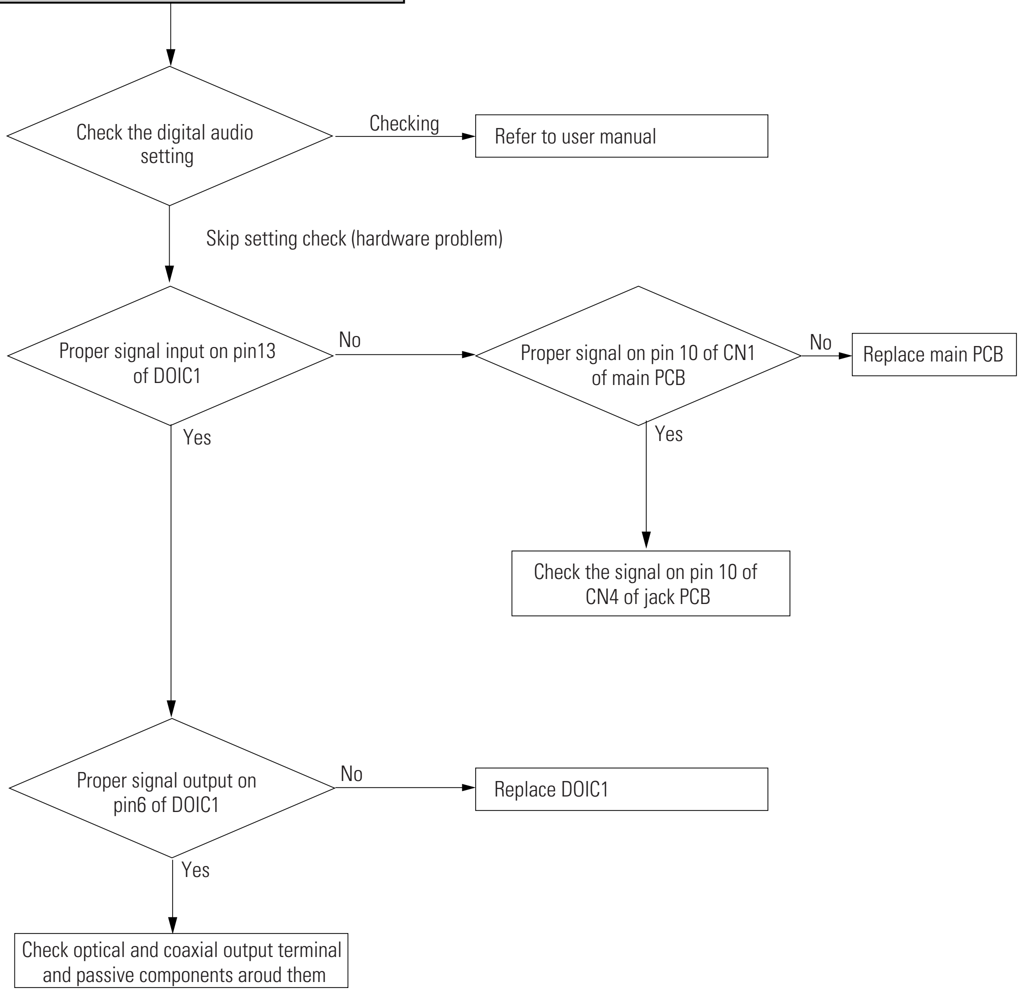
Tray repeating open/close operation

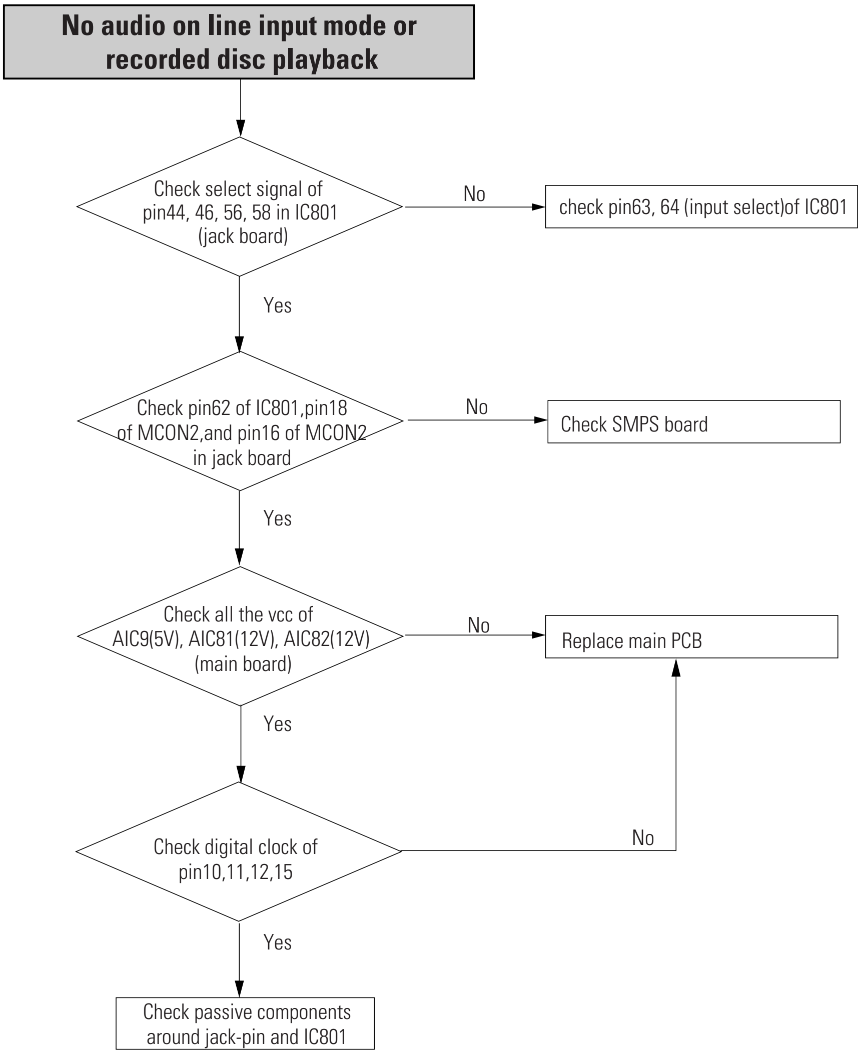

Is (key PCB) mounted correctly?
No
Check the soldering of Key PCB
Yes
Is the connection right between MCON1 and CN02 (VCR MAIN PCB)?
No
Check the connection between MCON1 and CN02
Yes
Check the short between KEY1 and SEG3

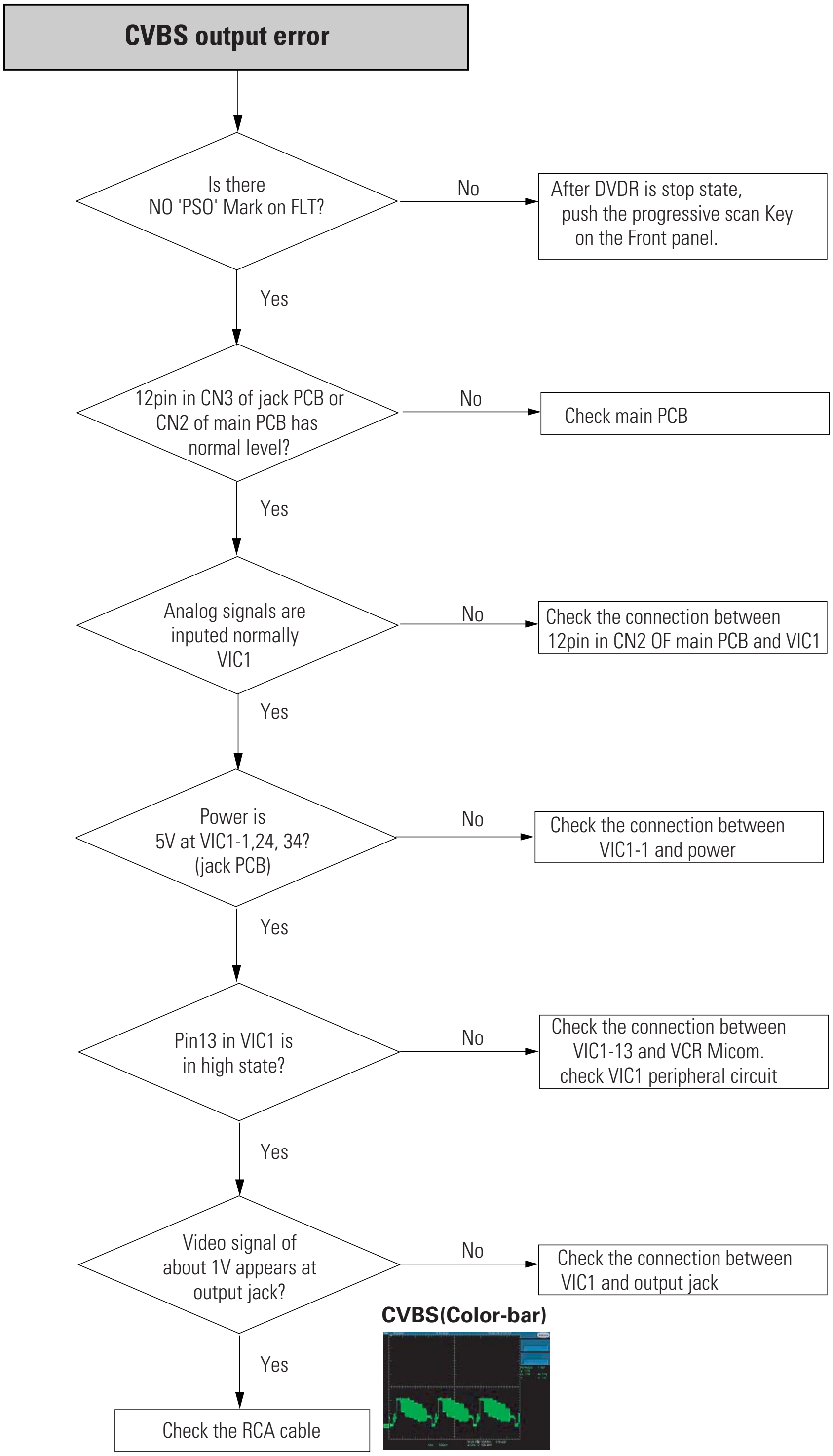

Disc loading error
Are main and deck power OK? 5V and 12V
No
Check the power
Yes
Is the 40pin FFC cable (between main & deck) inserted correctly?
No
Reinsert FFC cable correctly
Yes
Is the wavefrom of DIC3 pin26 normal? (main PCB)
No
Change the deck
DIC3-Pin26
Yes
Change the main board


No Analog Audio Output
Voltage of AR17 and AR31 is lower than 0.6V (jack PCB)
No
Check mute block
Yes
Proper Vss(5V) of AIC1 (main PCB) and Vcc(12V) of AIC4 (jack PCB)
No
Check SMPS board
Yes
Output from pin7 and pin8 of AIC1 of main PCB
No
Proper data between AIC1 and DIC1 (main PCB)
No
Replace main board
Yes
Yes
Proper output on pin1 and pin7 of AIC4
Check the board to board connector between jack PCB and main PCB
Yes
Check the passive components ardund jack pin

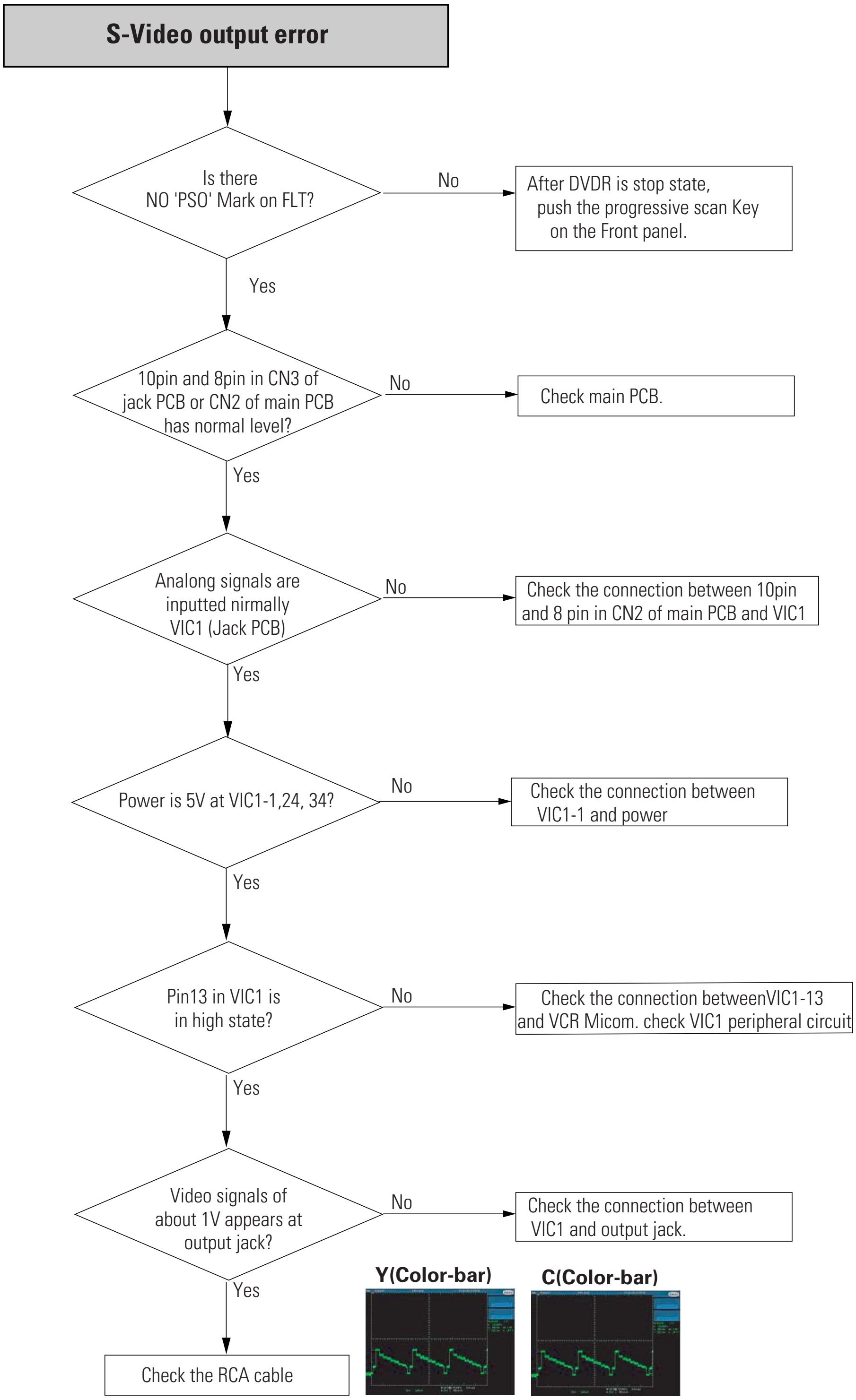
No digital audio out


Check the digital audio setting
Checking
Refer to user manual
Skip setting check (hardware problem)
Proper signal input on pin13 of DOIC1
No
Proper signal on pin 10 of CN1 of main PCB
No
Replace main PCB
Yes
Check the signal on pin 10 of CN4 of jack PCB
Yes
Proper signal output on pin6 of DOIC1
No
Replace DOIC1
Yes
Check optical and coaxial output terminal and passive components aroud them

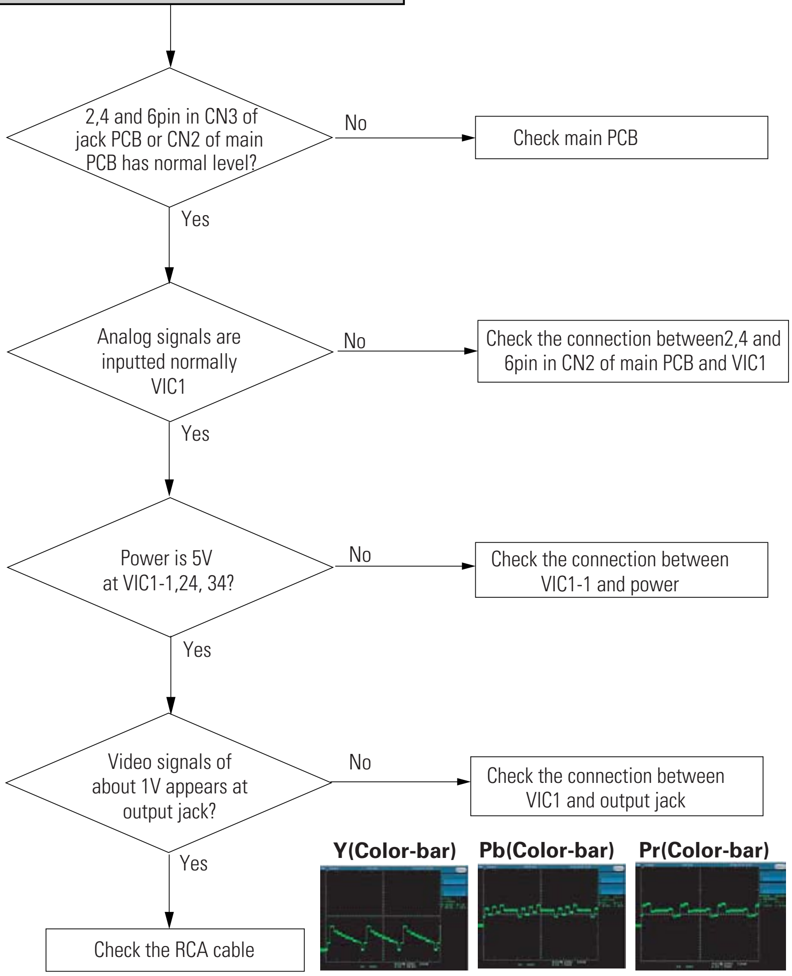

No audio on line input mode or recorded disc playback
Check select signal of pin44, 46, 56, 58 in IC801 (jack board)
No
check pin63, 64 (input select)of IC801
Yes
Check pin62 of IC801,pin18 of MCON2,and pin16 of MCON2 in jack board
No
Check SMPS board
Yes
Check all the vcc of AIC9(5V), AIC81(12V), AIC82(12V) (main board)
No
Replace main PCB
Yes
Check digital clock of pin10,11,12,15
No
Yes
Check passive components around jack-pin and IC801

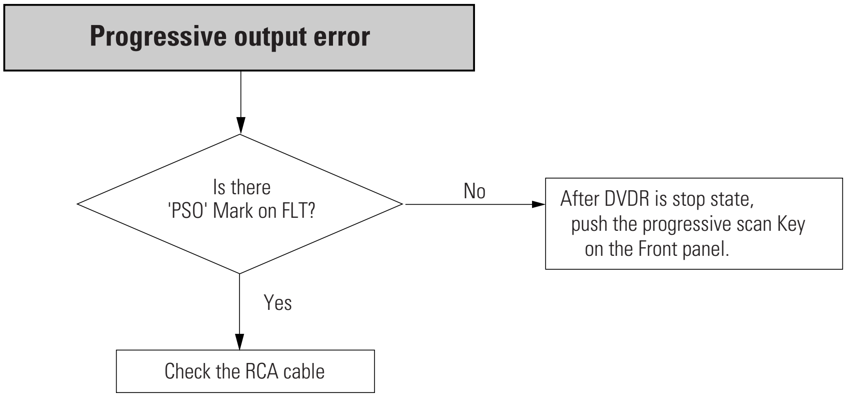

CVBS output error
Is there NO 'PSO' Mark on FLT?
No
After DVDR is stop state, push the progressive scan Key on the Front panel.
Yes
12pin in CN3 of jack PCB or CN2 of main PCB has normal level?
No
Check main PCB
Yes
Analog signals are inputed normally VIC1
No
Check the connection between 12pin in CN2 OF main PCB and VIC1
Yes
Power is 5V at VIC1-1,24, 34? (jack PCB)
No
Check the connection between VIC1-1 and power
Yes
Pin13 in VIC1 is in high state?
No
Check the connection between VIC1-13 and VCR Micom. check VIC1 peripheral circuit
Yes
Video signal of about 1V appears at output jack?
No
Check the connection between VIC1 and output jack
CVBS(Color-bar)
Yes
Check the RCA cable

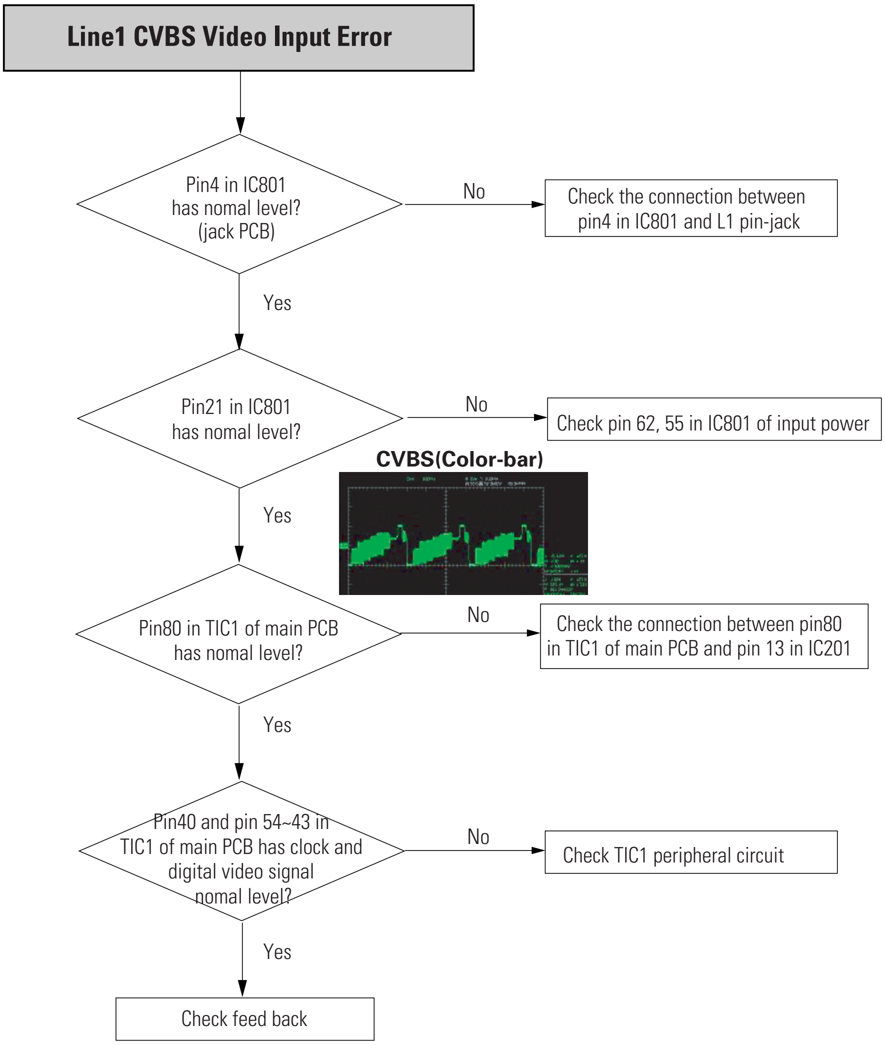
S-Video output error

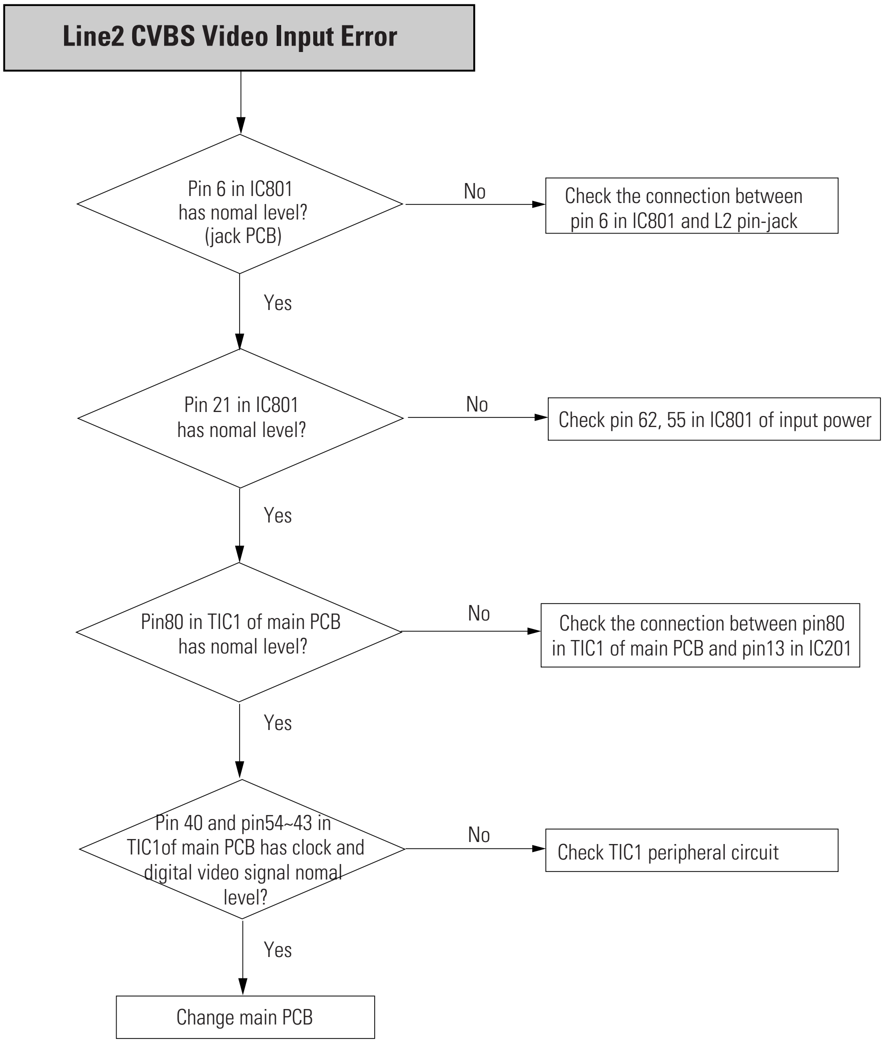

Is there
NO 'PSO' Mark on FLT?
No
After DVDR is stop state,
push the progressive scan Key
on the Front panel.
Yes
10pin and 8pin in CN3 of
jack PCB or CN2 of main PCB
has normal level?
No
Check main PCB.
Yes
Analong signals are
inputted nirmally
VIC1 (Jack PCB)
No
Check the connection between 10pin
and 8 pin in CN2 of main PCB and VIC1
Yes
Power is 5V at VIC1-1,24, 34?
No
Check the connection between
VIC1-1 and power
Yes
Pin13 in VIC1 is
in high state?
No
Check the connection betweenVIC1-13
and VCR Micom. check VIC1 peripheral circuit
Yes
Video signals of
about 1V appears at
output jack?
No
Check the connection between
VIC1 and output jack.
Yes
Check the RCA cable
Y(Color-bar)
C(Color-bar)

Component output error

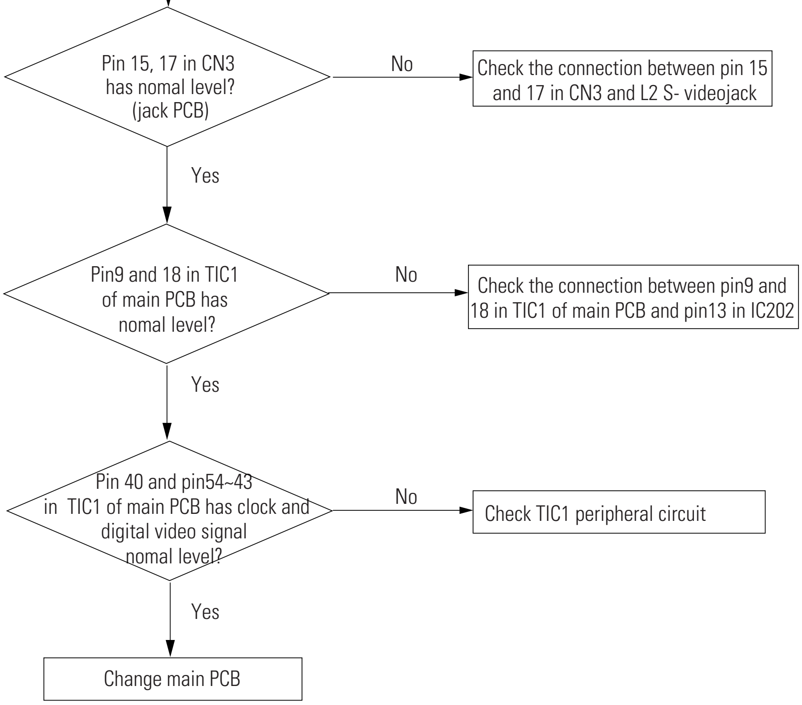

2,4 and 6pin in CN3 of jack PCB or CN2 of main PCB has normal level?
No
Check main PCB
Yes
Analog signals are inputted normally VIC1
No
Check the connection between2,4 and 6pin in CN2 of main PCB and VIC1
Yes
Power is 5V at VIC1-1,24, 34?
No
Check the connection between VIC1-1 and power
Yes
Video signals of about 1V appears at output jack?
No
Check the connection between VIC1 and output jack
Yes
Check the RCA cable
Y(Color-bar)
Pb(Color-bar)
Pr(Color-bar)


Progressive output error
Is there
'PSO' Mark on FLT?
No
After DVDR is stop state,
push the progressive scan Key
on the Front panel.
Yes
Check the RCA cable


Line1 CVBS Video Input Error
Pin4 in IC801 has nomal level? (jack PCB)
No
Check the connection between pin4 in IC801 and L1 pin-jack
Yes
Pin21 in IC801 has nomal level?
No
Check pin 62, 55 in IC801 of input power
CVBS(Color-bar)
Yes
Pin80 in TIC1 of main PCB has nomal level?
No
Check the connection between pin80 in TIC1 of main PCB and pin 13 in IC201
Yes
Pin40 and pin 54~43 in TIC1 of main PCB has clock and digital video signal nomal level?
No
Check TIC1 peripheral circuit
Yes
Check feed back


Line2 CVBS Video Input Error
Pin 6 in IC801 has nomal level? (jack PCB)
No
Check the connection between pin 6 in IC801 and L2 pin-jack
Yes
Pin 21 in IC801 has nomal level?
No
Check pin 62, 55 in IC801 of input power
Yes
Pin80 in TIC1 of main PCB has nomal level?
No
Check the connection between pin80 in TIC1 of main PCB and pin13 in IC201
Yes
Pin 40 and pin54~43 in TIC1of main PCB has clock and digital video signal nomal level?
No
Check TIC1 peripheral circuit
Yes
Change main PCB

Line2 S-Video Video Input Error


Pin 15, 17 in CN3
has nomal level?
(jack PCB)
No
Check the connection between pin 15 and 17 in CN3 and L2 S- videojack
Yes
Pin9 and 18 in TIC1 of main PCB has nomal level?
No
Check the connection between pin9 and 18 in TIC1 of main PCB and pin13 in IC202
Yes
Pin 40 and pin54~43 in TIC1 of main PCB has clock and digital video signal nomal level?
No
Check TIC1 peripheral circuit
Yes
Change main PCB

MEMO

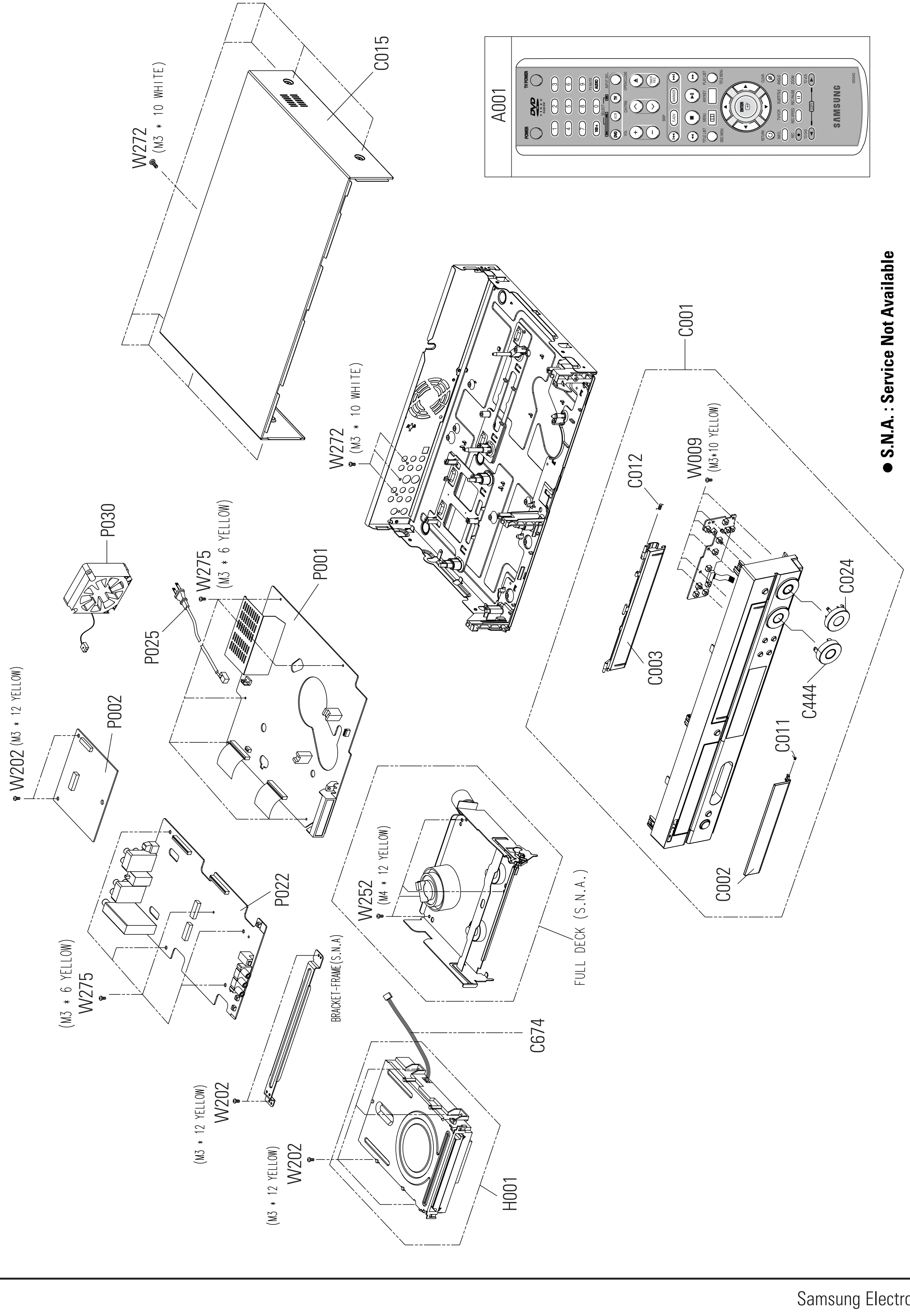
7. Exploded View and Parts List

7-1 Cabinet Assembly - 7-2

7-2 VCR Mechanical Parts (Top Side) - 7-4

7-3 VCR Mechanical Parts (Bottom Side) - 7-6

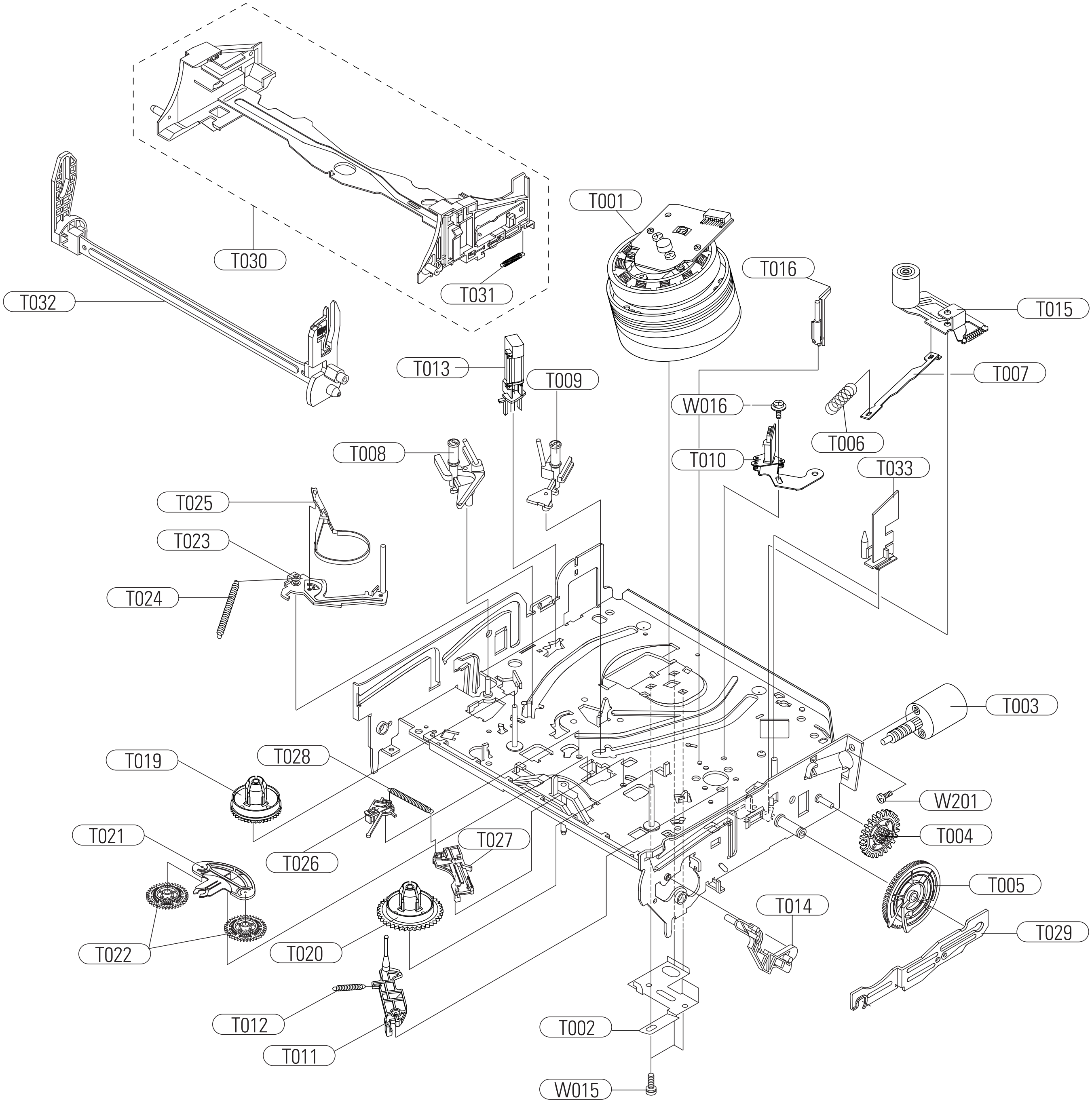
7-1 Cabinet Assembly


C015
W272
(M3 * 10 WHITE)
A001
C001
W272
(M3 * 10 WHITE)
W009
(M3*10 YELLOW)
C012
C003
C024
C444
C011
C002
P030
W275
(M3 * 6 YELLOW)
P001
P025
W202 (M3 * 12 YELLOW)
P002
P022
W252
(M4 * 12 YELLOW)
FULL DECK (S.N.A.)
(M3 * 6 YELLOW)
W275
BRACKET-FRAME(S.N.A)
C674
(M3 * 12 YELLOW)
W202
(M3 * 12 YELLOW)
W202
H001

● S.N.A. : Service Not Available

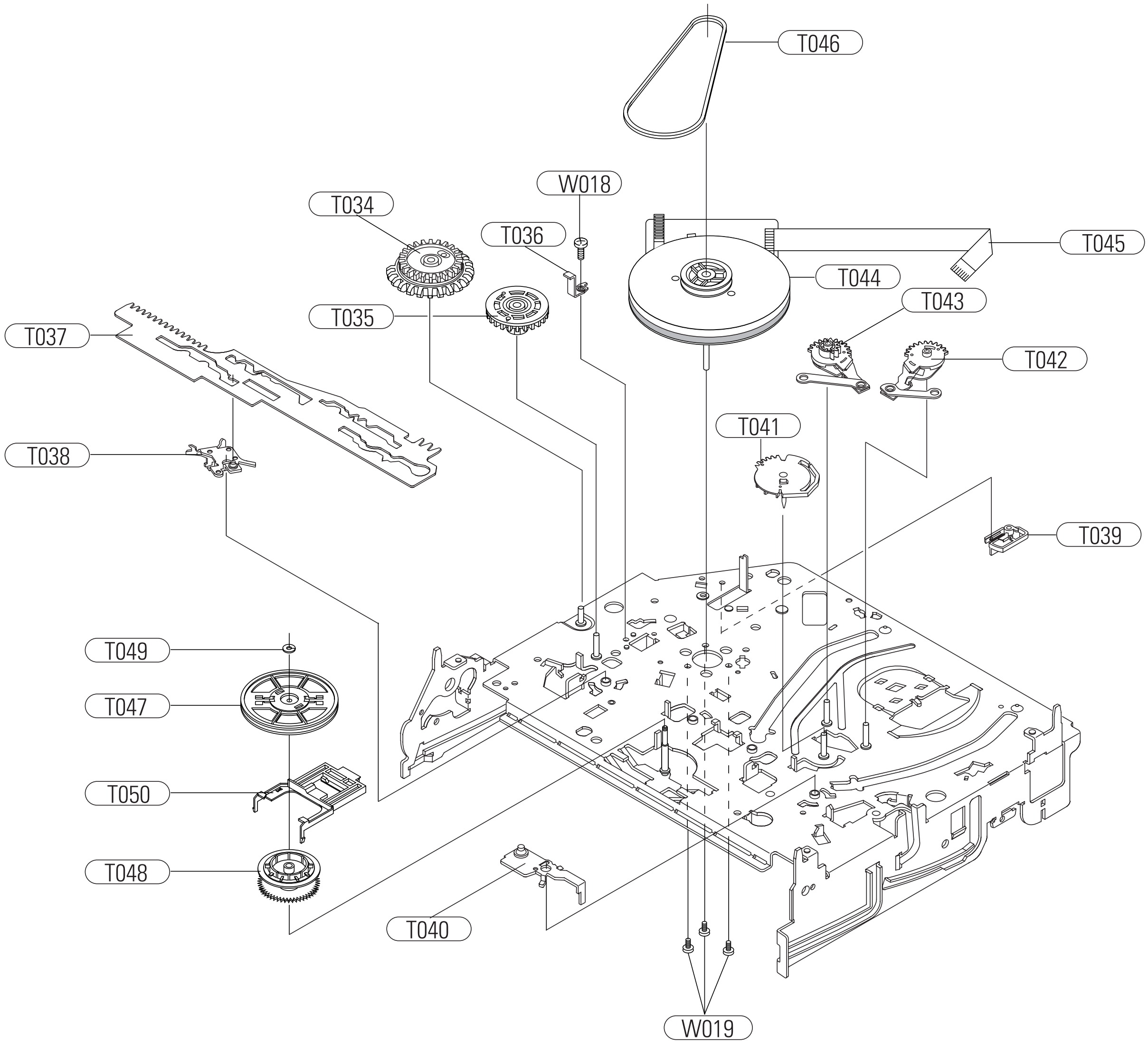
Loc. No	Parts No.	Description ; Specification	Q'ty	S.N.A	Remark
A001	AK59-00034H	REMOCON-ASSY;DVD-VR320/XAX,SEC,210*55,-,	1	SA	
C001	AK97-01200A	ASSY-PANEL FRONT;HIPS94V2 GRAY,DVD-VR320	1	SA	
C002	AK64-01078A	DOOR-TRAY;DVD-VR320,ABS94HB,T2.0,H26.5,W	1	SA	
C003	AK64-01077A	DOOR-CASSETTE;DVD-VR320,ABS94HB,T2.0,H26	1	SA	
C011	AK64-00334A	DOOR-SPRING;DVD-V3500,SWPB,,,,-,,	1	SA	
C012	AC61-62032A	SPRING ETC-MASK;SV-C130,SUS,4.4,-,-,-,-,	1	SA	
C015	AK64-01073A	CABINET-TOP;DVD-VR320,TEXTURE,T0.525,W59	1	SA	
C024	AK64-01088A	BUTTON-FUNCTION;DVD-VR320,ABS94,40*40,M,	1	SA	
C444	AK64-01085A	BUTTON-SELECT;DVD-VR320,ABS 94,50*40,HB,	2	SA	
C674	AK39-00049A	LEAD CONNECTOR;-,-,-,4,150,WHT,-,SMH200-	1	SA	
H001	AK97-01211A	ASSY-ASSY LOADER DRIVE;-,SV-R250,ASSY LO	1	SA	
P001	AK92-00585C	ASSY PCB-MAIN VCR;DVD-VR320/AXAA,K2 R-Co	1	SA	
P002	AK92-00752A	ASSY PCB-MAIN DVD;DVD-VR320A/XAA,SEC,TW	1	SA	
P022	AK92-00732A	ASSY PCB-MAIN JACK;DVD-VR320A/XAA,K2-2.5	1	SA	
P025	AH39-10061A	CBF-POWER CORD;KJ-10W,EP2,AWG2/18,1.83M,	1	SA	
P030	3103-001152	FAN-DC;DC 12.0V,110mA,1700rpm,0.581m^	1	SA	
W009	6003-000276	SCREW-TAPTITE;BH,+,B,M3,L10,ZPC(YEL),SWC	6	SA	
W202	6003-000277	SCREW-TAPTITE;BH,+,B,M3,L12,ZPC(YEL),SWR	8	SA	
W252	AC60-12126A	SCREW-MACHINE;-,-,FE,FZY,BH,-,-,4*12,-,-	4	SA	
W272	6003-001464	SCREW-TAPTITE;BH,+,B,M3,L10,ZPC(WHT)	8	SA	
W275	6003-001561	SCREW-TAPTITE;BH,+,-,B,M3,L6,ZPC(YEL),SW	10	SA	

7-2 VCR Mechanical Parts (Top Side)


T001
T030
T016
T015
T032
T031
T013
T009
T007
W016
T006
T008
T010
T033
T025
T023
T024
T003
T019
T028
W201
T021
T004
T027
T026
T005
T014
T029
T022
T020
T012
T002
T011
W015

Loc. No	Parts No.	Description ; Specification	Q'ty	S.N.A	Remark
T001	AC97-02511A	ASSY-CYLINDER;6ANJ(ALPS),6NJ(SEM),CX11A-	1	SA	
T002	AC70-00002A	PLATE-GND DECK;X-11,SPTE,T0.3,-,-,-,-	1	SA	
T003	AC97-01652A	ASSY-LOADING MOTOR;SANKYO LOADING MOTOR,	1	SA	
T004	AC66-00008A	GEAR-WORM WHEEL;TS-10,POM,0.8,40,-,NAT,3	1	SA	
T005	AC66-00011A	GEAR-FL CAM;TS-10,POM,0.8,59,-,BLK,48.48	1	SA	
T006	AC61-00105A	SPRING ETC-PINCH DRIVE;TS-10,SUS304-WPB,	1	SA	
T007	AC61-30180A	PLATE-JOINT;X-9,SECC20/20,T0.8,-,-,-,-	1	SA	
T008	AC66-80142A	SLIDER-SUPPLY ASSY;X-9,SUS,-,-,-,SIL,-	1	SA	
T009	AC66-80141A	SLIDER-TAKE UP ASSY;X-9,SUS,-,-,-,SIL,-	1	SA	
T010	AC97-02517A	ASSY-HEAD ACE;ASSY-HEAD ACE,DX11A,DX11A	1	SA	
T011	AC66-00074A	LEVER-GUIDE(#9);TS-9,PPS,-,-,-,-,BLK,KHA	1	SA	
T012	AC61-60553A	SPRING ETC-GUIDE 9;X-9,SUS304-WPB,0.25,-	1	SA	
T013	AC33-00015A	HEAD-FE;HVFHP0050A,PBT3300,2PIN,NATURA	1	SA	
T014	AC66-00083A	LEVER-FL DOOR;X-11,POM(K300),-,-,-,-,BLU	1	SA	
T015	AC97-02293A	ASSY-UNIT PINCH;SECC+SUS304,TS-10,FOR X-	1	SA	
T016	AC97-02215A	ASSY-POST #8 GUIDE;SUS303+POM(M90-44)EQ,	1	SA	
T019	AC66-10267A	REEL-DISK S;X-9,POM,-,-,-,-,-,-	1	SA	
T020	AC66-10268A	REEL-DISK T;X-9,POM,-,-,-,-,-,-	1	SA	
T021	AC66-30524A	LEVER-IDLER;-,POM,-,-,-,-,BLK,-	1	SA	
T022	AC66-00039A	GEAR-IDLE;TS-10,PET K3372,0.5,-,-,NTR,28	2	SA	
T023	AC66-00035A	LEVER-TENSION ASS'Y;TS-10,SECC E20/20+SU	1	SA	
T024	AC61-00107A	SPRING ETC-TENSION LEVER;TS-10,SUS304-WP	1	SA	
T025	AC69-00104A	BAND-BRAKE ASS'Y;TS-10,-,-,-,-,-,-	1	SA	
T026	AC66-30550A	LEVER-S.BRAKE ASSY;-,POM+SUS,-,-,-,X-9	1	SA	
T027	AC66-30549A	LEVER-T.BRAKE ASSY;-,POM+SUS,-,-,-,X-9	1	SA	
T028	AC61-00106A	SPRING ETC-BRAKE;TS-10,SUS304-WPB,-,-,-,	1	SA	
T029	AC66-00020A	SLIDER-FL DRIVE;TS-10,SECC ,T1.0,-,-,SIL	1	SA	
T030	AC97-02323A	ASSY-HOLDER FL CASSETTE;SECC+POM,X-11,Fo	1	SA	
T031	AC61-60561A	SPRING ETC-FL.LEVER-LR;X-9,SUS304 WPB,OD	1	SA	
T032	AC97-02324A	ASSY-LEVER FL ARM;SECC+POM,X-11,For X-11	1	SA	
T033	AC61-50658A	GUIDE-CASS. DOOR;X-9,POM,-,-,-,NTR	1	SA	
W015	6006-001092	SCREW-MACHINE;WS,PH,+,M3.0,L6.0,ZPC(YEL)	3	SA	
W016	6006-001154	SCREW-TAPTITE;WSP,PH,+,M2.6,L5.6,ZPC(YEL	1	SA	
W201	6001-001711	SCREW-MACHINE;PH,+,M3,L3.3,ZPC(YEL)	1	SA	

7-3 VCR Mechanical Parts (Bottom Side)


T046
W018
T034
T036
T045
T044
T043
T035
T037
T042
T041
T038
T039
T049
T047
T050
T048
T040
W019

Loc. No	Parts No.	Description ; Specification	Q'ty	S.N.A	Remark
T034	AC66-00076A	GEAR-JOINT 1;X-11,POM(K300),-,-,-,BLUE,-	1	SA	
T035	AC66-00077A	GEAR-JOINT 2;X-11,POM(K300),-,-,-,BLUE,-	1	SA	
T036	AC61-00338A	BRACKET-GEAR;X-11,SECC,T0.8,W20,L20,NTR,	1	SA	
T037	AC66-00075A	SLIDER-CAM;X-11,SECC ,T1.2,-,-,SIL,-	1	SA	
T038	AC66-00017A	LEVER-PINCH DRIVE;TS-10,SECC E20/20,1.0	1	SA	
T039	AC70-00003A	HOOK-CAPSTAN;-,-,L10,W10,H10,POM(M90-44)	1	SA	
T040	AC66-00016A	LEVER-TENSION DRIVE;TS-10,SECC E20/20,1	1	SA	
T041	AC66-00078A	GEAR-LOADING DRIVE;X-11,POM(K300),-,-,-,	1	SA	
T042	AC97-02195A	ASSY-LEVER LOADING S;SECC+POM+SUS,X-11,F	1	SA	
T043	AC97-02196A	ASSY-LEVER LOADING T;SECC+POM+SUS,X-11,F	1	SA	
T044	3101-001419	MOTOR-CAPSTAN;-,-,12V,90mA	1	SA	
T045	3809-001270	CABLE-FLAT;30V,80C,140MM,10P,1.25MM,UL28	1	SA	
T046	AC66-60051A	BELT-PULLEY;-,5CM-70,2 * 2,-,71.3,-,X-9	1	SA	
T047	AC61-21012A	HOLDER-CLUTCH ASSY;X-9,ABS,-,-,-,BLK,-	1	SA	
T048	AC66-20581A	GEAR-CENTER ASSY;X-9,POM,M=O.5,-,-,GRY,-	1	SA	
T049	AC60-30306A	FASTENER-WASHER SLIT;-,-,ID2.1,OD5.0,T0.	1	SA	
T050	AC66-00006A	LEVER-UP DOWN;TS-10,POM,-,-,-,-,NAT,-	1	SA	
W018	6003-001450	SCREW-TAPTITE;PH,+,S,M2.6,L5,ZPC(YEL)	1	SA	
W019	6003-000108	SCREW-TAPTITE;BH,+,B,M2.6,L6,ZPC(YEL),SW	3	SA	

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8. Electrical Parts List

Loc.No	Part No	Description ; Specification	Q'ty	S.N.A	Remark
P001	**AK92-00585C**	**ASSY PCB-MAIN VCR;DVD-VR320/AXAA,K2 R-Co**	**1**	**SA**	
C1P103	2401-002144	C-AL;47uF,20%,16V,GP,TP,5x11,5	1	SA	
C1P104	2401-001492	C-AL;47uF,20%,16V,GP,-,5x7mm,2.5	1	SA	
C1P105	2401-002144	C-AL;47uF,20%,16V,GP,TP,5x11,5	1	SA	
C1P107	2401-000303	C-AL;100uF,20%,25V,GP,TP,6.3x11,5	1	SA	
C1P108	2401-000303	C-AL;100uF,20%,25V,GP,TP,6.3x11,5	1	SA	
C1P110	2401-002144	C-AL;47uF,20%,16V,GP,TP,5x11,5	1	SA	
C1P112	2401-001250	C-AL;4.7uF,20%,35V,GP,TP,4x5,5	1	SA	
C1P114	2401-001250	C-AL;4.7uF,20%,35V,GP,TP,4x5,5	1	SA	
C1P115	2401-001250	C-AL;4.7uF,20%,35V,GP,TP,4x5,5	1	SA	
C1P120	2401-000598	C-AL;1uF,20%,50V,GP,TP,4x7,5	1	SA	
C1P121	2401-001250	C-AL;4.7uF,20%,35V,GP,TP,4x5,5	1	SA	
C1P122	2401-000598	C-AL;1uF,20%,50V,GP,TP,4x7,5	1	SA	
C1P123	2401-001730	C-AL;10UF,20%,50V,GP,TP,5X11,5	1	SA	
C1P124	2401-001250	C-AL;4.7uF,20%,35V,GP,TP,4x5,5	1	SA	
C1P125	2401-001728	C-AL;10uF,20%,35V,GP,TP,5x7,5	1	SA	
C1P126	2401-000414	C-AL;10uF,20%,16V,GP,TP,4x7,5	1	SA	
C1P127	2401-001250	C-AL;4.7uF,20%,35V,GP,TP,4x5,5	1	SA	
C1P128	2401-002144	C-AL;47uF,20%,16V,GP,TP,5x11,5	1	SA	
C1S01	2401-003365	C-AL;150uF,20%,200V,GP,TP,18x25,7.5	1	SA	
C1S02	2201-000963	C-CERAMIC,DISC;1NF,20%,400V,Y5U,TP,9.5X6	1	SA	
C1S03	2201-000963	C-CERAMIC,DISC;1NF,20%,400V,Y5U,TP,9.5X6	1	SA	
C1S04	2301-001711	C-FILM,LEAD;220nF,°æ20%,275V,BK,17.5*10*	1	SA	
C1S05	2301-001711	C-FILM,LEAD;220nF,°æ20%,275V,BK,17.5*10*	1	SA	
C1S06	2201-000987	C-CERAMIC,DISC;2.2NF,20%,400V,Y5U,BK,12.	1	SA	
C1S07	2201-000012	C-CERAMIC,DISC;0.22nF,10%,1000V,Y5P,-,6.	1	SA	
C1S08	2305-001029	C-FILM,LEAD-PEF;10nF,10%,630V,TP,12x9x12	1	SA	
C1S09	2401-002608	C-AL;33uF,20%,35V,GP,TP,5x11,5	1	SA	
C1S10	2401-002608	C-AL;33uF,20%,35V,GP,TP,5x11,5	1	SA	
C1S11	2401-000598	C-AL;1uF,20%,50V,GP,TP,4x7,5	1	SA	
C1S12	2301-000383	C-FILM,LEAD-PEF;10nF,5%,50V,TP,6x7x3.2mm	1	SA	
C1S30	2401-003390	C-AL;2200uF,20%,16V,LZ,TP,13x31.5,5	1	SA	
C1S31	2401-003390	C-AL;2200uF,20%,16V,LZ,TP,13x31.5,5	1	SA	
C1S32	2401-000385	C-AL;10uF,20%,100V,GP,TP,6.3x11,5	1	SA	
C1S33	2401-001126	C-AL;330uF,20%,25V,WT,TP,10x12.5,5	1	SA	
C1S34	2401-001126	C-AL;330uF,20%,25V,WT,TP,10x12.5,5	1	SA	
C1S37	2401-001479	C-AL;470uF,20%,10V,GP,TP,6.3*11mm,5	1	SA	
C1S38	2401-001479	C-AL;470uF,20%,10V,GP,TP,6.3*11mm,5	1	SA	
C1S39	2301-000129	C-FILM,LEAD-PEF;100nF,5%,50V,TP,10X9X4.3	1	SA	
C1S41	2401-001126	C-AL;330uF,20%,25V,WT,TP,10x12.5,5	1	SA	
C301	2203-005065	C-CER,CHIP;1000nF,+80-20%,10V,Y5V,1608	1	SA	
C302	2203-006243	C-CER,CHIP;0.36nF,10%,50V,X7R,1608	1	SA	
C303	2203-005065	C-CER,CHIP;1000nF,+80-20%,10V,Y5V,1608	1	SA	
C304	2203-000405	C-CER,CHIP;0.18NF,5%,50V,C0G,TP,1608	1	SA	
C305	2203-005065	C-CER,CHIP;1000nF,+80-20%,10V,Y5V,1608	1	SA	
C306	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C307	2401-001492	C-AL;47uF,20%,16V,GP,-,5x7mm,2.5	1	SA	
C308	2401-000909	C-AL;22uF,20%,16V,GP,TP,5x5,2.5	1	SA	
C309	2401-002112	C-AL;10uF,20%,16V,GP,TP,4x7,2.5	1	SA	
C310	2203-005065	C-CER,CHIP;1000nF,+80-20%,10V,Y5V,1608	1	SA	
C312	2203-000257	C-CER,CHIP;10nF,10%,50V,X7R,TP,1608	1	SA	
C314	2203-005065	C-CER,CHIP;1000nF,+80-20%,10V,Y5V,1608	1	SA	
C315	2203-005065	C-CER,CHIP;1000nF,+80-20%,10V,Y5V,1608	1	SA	
C316	2203-005065	C-CER,CHIP;1000nF,+80-20%,10V,Y5V,1608	1	SA	
C317	2203-005065	C-CER,CHIP;1000nF,+80-20%,10V,Y5V,1608	1	SA	
C318	2202-000797	C-CERAMIC,MLC-AXIAL;10NF,30%,16V,Y5S,TP,	1	SA	
C319	2202-000797	C-CERAMIC,MLC-AXIAL;10NF,30%,16V,Y5S,TP,	1	SA	
C320	2203-000257	C-CER,CHIP;10nF,10%,50V,X7R,TP,1608	1	SA	
C321	2401-003221	C-AL;100uF,20%,16V,GP,TP,8X5,2.5	1	SA	
C322	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C323	2203-005065	C-CER,CHIP;1000nF,+80-20%,10V,Y5V,1608	1	SA	
C324	2203-000257	C-CER,CHIP;10nF,10%,50V,X7R,TP,1608	1	SA	
C325	2203-005065	C-CER,CHIP;1000nF,+80-20%,10V,Y5V,1608	1	SA	
C326	2203-002398	C-CER,CHIP;22nF,10%,50V,X7R,1608	1	SA	
C327	2203-005065	C-CER,CHIP;1000nF,+80-20%,10V,Y5V,1608	1	SA	
C328	2401-003221	C-AL;100uF,20%,16V,GP,TP,8X5,2.5	1	SA	
C329	2203-000257	C-CER,CHIP;10nF,10%,50V,X7R,TP,1608	1	SA	
C330	2203-000975	C-CER,CHIP;47nF,10%,25V,X7R,TP,1608,-	1	SA	
C331	2203-000975	C-CER,CHIP;47nF,10%,25V,X7R,TP,1608,-	1	SA	
C332	2203-000975	C-CER,CHIP;47nF,10%,25V,X7R,TP,1608,-	1	SA	
C333	2203-000975	C-CER,CHIP;47nF,10%,25V,X7R,TP,1608,-	1	SA	
C334	2401-001492	C-AL;47uF,20%,16V,GP,-,5x7mm,2.5	1	SA	
C335	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C336	2203-005065	C-CER,CHIP;1000nF,+80-20%,10V,Y5V,1608	1	SA	
C337	2401-001492	C-AL;47uF,20%,16V,GP,-,5x7mm,2.5	1	SA	
C338	2203-000257	C-CER,CHIP;10nF,10%,50V,X7R,TP,1608	1	SA	
C340	2401-000918	C-AL;22uF,20%,16V,GP,-,6.3x7,5	1	SA	
C342	2401-001169	C-AL;33UF,20%,16V,GP,-,6.3X7,5	1	SA	
C343	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C344	2203-001211	C-CER,CHIP;8.2nF,10%,50V,X7R,TP,1608	1	SA	
C345	2203-000257	C-CER,CHIP;10nF,10%,50V,X7R,TP,1608	1	SA	
C346	2401-000414	C-AL;10uF,20%,16V,GP,TP,4x7,5	1	SA	
C347	2203-000491	C-CER,CHIP;2.2nF,10%,50V,X7R,TP,1608,-	1	SA	
C348	2203-001052	C-CER,CHIP;0.56nF,10%,50V,X7R,TP,1608	1	SA	
C349	2401-001250	C-AL;4.7uF,20%,35V,GP,TP,4x5,5	1	SA	
C350	2203-001103	C-CER,CHIP;6.8nF,10%,50V,X7R,TP,1608,-	1	SA	
C351	2203-001211	C-CER,CHIP;8.2nF,10%,50V,X7R,TP,1608	1	SA	
C352	2203-000257	C-CER,CHIP;10nF,10%,50V,X7R,TP,1608	1	SA	
C353	2401-001250	C-AL;4.7uF,20%,35V,GP,TP,4x5,5	1	SA	
C354	2203-002041	C-CER,CHIP;0.47nF,10%,50V,X7R,TP,1608	1	SA	
C355	2301-000110	C-FILM,LEAD-PEF;1.8nF,5%,100V,TP,7x3.0x6	1	SA	
C356	2401-001492	C-AL;47uF,20%,16V,GP,-,5x7mm,2.5	1	SA	
C357	2301-000174	C-FILM,LEAD-PEF;15nF,5%,100V,TP,7.2x4.0x	1	SA	
C358	2203-000257	C-CER,CHIP;10nF,10%,50V,X7R,TP,1608	1	SA	
C359	2203-000257	C-CER,CHIP;10nF,10%,50V,X7R,TP,1608	1	SA	
C360	2203-000257	C-CER,CHIP;10nF,10%,50V,X7R,TP,1608	1	SA	
C371	2203-001071	C-CER,CHIP;0.056nF,5%,50V,C0G,1608	1	SA	
C372	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C502	2202-002037	C-CERAMIC,MLC-AXIAL;100nF,80-20%,50V,Y5V	1	SA	
C503	2401-002112	C-AL;10uF,20%,16V,GP,TP,4x7,2.5	1	SA	
C504	2203-005065	C-CER,CHIP;1000nF,+80-20%,10V,Y5V,1608	1	SA	
C505	2401-000909	C-AL;22uF,20%,16V,GP,TP,5x5,2.5	1	SA	

Loc.No	Part No	Description ; Specification	Q'ty	S.N.A	Remark
C506	2401-002112	C-AL;10uF,20%,16V,GP,TP,4x7,2.5	1	SA	
C507	2203-001724	C-CER,CHIP;4700NF,+80-20%,16V,Y5V,TP,321	1	SA	
C508	2203-000257	C-CER,CHIP;10nF,10%,50V,X7R,TP,1608	1	SA	
C509	2401-000909	C-AL;22uF,20%,16V,GP,TP,5x5,2.5	1	SA	
C510	2203-000888	C-CER,CHIP;4.7nF,10%,50V,X7R,TP,1608	1	SA	
C511	2203-000257	C-CER,CHIP;10nF,10%,50V,X7R,TP,1608	1	SA	
C513	2203-001724	C-CER,CHIP;4700NF,+80-20%,16V,Y5V,TP,321	1	SA	
C514	2401-002112	C-AL;10uF,20%,16V,GP,TP,4x7,2.5	1	SA	
C515	2203-000257	C-CER,CHIP;10nF,10%,50V,X7R,TP,1608	1	SA	
C516	2401-000909	C-AL;22uF,20%,16V,GP,TP,5x5,2.5	1	SA	
C517	2203-000888	C-CER,CHIP;4.7nF,10%,50V,X7R,TP,1608	1	SA	
C518	2203-000257	C-CER,CHIP;10nF,10%,50V,X7R,TP,1608	1	SA	
C519	2203-001724	C-CER,CHIP;4700NF,+80-20%,16V,Y5V,TP,321	1	SA	
C520	2401-002112	C-AL;10uF,20%,16V,GP,TP,4x7,2.5	1	SA	
C521	2203-005065	C-CER,CHIP;1000nF,+80-20%,10V,Y5V,1608	1	SA	
C522	2202-000797	C-CERAMIC,MLC-AXIAL;10NF,30%,16V,Y5S,TP,	1	SA	
C531	2401-001492	C-AL;47uF,20%,16V,GP,-,5x7mm,2.5	1	SA	
C532	2203-000257	C-CER,CHIP;10nF,10%,50V,X7R,TP,1608	1	SA	
C543	2203-001724	C-CER,CHIP;4700NF,+80-20%,16V,Y5V,TP,321	1	SA	
C544	2203-001724	C-CER,CHIP;4700NF,+80-20%,16V,Y5V,TP,321	1	SA	
C545	2203-000257	C-CER,CHIP;10nF,10%,50V,X7R,TP,1608	1	SA	
C551	2401-002112	C-AL;10uF,20%,16V,GP,TP,4x7,2.5	1	SA	
C552	2203-000257	C-CER,CHIP;10nF,10%,50V,X7R,TP,1608	1	SA	
C603	2203-005065	C-CER,CHIP;1000nF,+80-20%,10V,Y5V,1608	1	SA	
C604	2203-000257	C-CER,CHIP;10nF,10%,50V,X7R,TP,1608	1	SA	
C605	2401-000360	C-AL;100uF,20%,50V,GP,TP,8x11.5,5	1	SA	
C606	2203-000257	C-CER,CHIP;10nF,10%,50V,X7R,TP,1608	1	SA	
C607	2203-000257	C-CER,CHIP;10nF,10%,50V,X7R,TP,1608	1	SA	
C608	2401-003221	C-AL;100uF,20%,16V,GP,TP,8X5,2.5	1	SA	
C609	2203-002398	C-CER,CHIP;22nF,10%,50V,X7R,1608	1	SA	
C610	2203-000975	C-CER,CHIP;47nF,10%,25V,X7R,TP,1608,-	1	SA	
C611	2203-000783	C-CER,CHIP;0.33NF,5%,50V,C0G,TP,1608	1	SA	
C613	2401-002095	C-AL;47uF,20%,25V,GP,TP,6.3x5,5	1	SA	
C614	2203-000257	C-CER,CHIP;10nF,10%,50V,X7R,TP,1608	1	SA	
C615	2203-000257	C-CER,CHIP;10nF,10%,50V,X7R,TP,1608	1	SA	
C616	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C617	2401-001492	C-AL;47uF,20%,16V,GP,-,5x7mm,2.5	1	SA	
C620	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
C622	2203-005065	C-CER,CHIP;1000nF,+80-20%,10V,Y5V,1608	1	SA	
C623	2202-000121	C-CERAMIC,MLC-AXIAL;100pF,10%,50V,Y5P,TP	1	SA	
C624	2401-002165	C-AL;100uF,20%,16V,GP,TP,6.3x7,5	1	SA	
C625	2202-000797	C-CERAMIC,MLC-AXIAL;10NF,30%,16V,Y5S,TP,	1	SA	
C626	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C627	2203-001697	C-CER,CHIP;0.082nF,5%,50V,NP0,1608	1	SA	
C628	2401-001168	C-AL;33uF,20%,16V,GP,TP,6.3x5,2.5	1	SA	
C629	2203-005221	C-CER,CHIP;15nF,10%,50V,X7R,TP,1608,-	1	SA	
C630	2401-001492	C-AL;47uF,20%,16V,GP,-,5x7mm,2.5	1	SA	
C631	2203-000257	C-CER,CHIP;10nF,10%,50V,X7R,TP,1608	1	SA	
C632	2203-001071	C-CER,CHIP;0.056nF,5%,50V,C0G,1608	1	SA	
C633	2203-000140	C-CER,CHIP;1.5nF,10%,50V,X7R,1608	1	SA	
C634	2203-001071	C-CER,CHIP;0.056nF,5%,50V,C0G,1608	1	SA	
C635	2202-000797	C-CERAMIC,MLC-AXIAL;10NF,30%,16V,Y5S,TP,	1	SA	
C636	2202-000797	C-CERAMIC,MLC-AXIAL;10NF,30%,16V,Y5S,TP,	1	SA	
C637	2203-000257	C-CER,CHIP;10nF,10%,50V,X7R,TP,1608	1	SA	
C640	2401-002165	C-AL;100uF,20%,16V,GP,TP,6.3x7,5	1	SA	
C643	2203-000257	C-CER,CHIP;10nF,10%,50V,X7R,TP,1608	1	SA	
C644	2203-000257	C-CER,CHIP;10nF,10%,50V,X7R,TP,1608	1	SA	
C647	2202-000216	C-CERAMIC,MLC-AXIAL;0.027NF,5%,50V,SL,TP	1	SA	
C651	2202-000216	C-CERAMIC,MLC-AXIAL;0.027NF,5%,50V,SL,TP	1	SA	
C652	2202-000216	C-CERAMIC,MLC-AXIAL;0.027NF,5%,50V,SL,TP	1	SA	
C653	2203-000257	C-CER,CHIP;10nF,10%,50V,X7R,TP,1608	1	SA	
C657	2203-000257	C-CER,CHIP;10nF,10%,50V,X7R,TP,1608	1	SA	
C658	2202-000295	C-CERAMIC,MLC-AXIAL;68pF,5%,50V,SL,TP,3.	1	SA	
C660	2202-000797	C-CERAMIC,MLC-AXIAL;10NF,30%,16V,Y5S,TP,	1	SA	
C701	2203-000440	C-CER,CHIP;1nF,10%,50V,X7R,TP,1608,-	1	SA	
C702	2203-000257	C-CER,CHIP;10nF,10%,50V,X7R,TP,1608	1	SA	
C703	2401-002165	C-AL;100uF,20%,16V,GP,TP,6.3x7,5	1	SA	
C704	2401-003480	C-AL;1000UF,20%,10V,LZ,TP,10X16MM,5	1	SA	
C705	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
CN01	3708-000270	CONNECTOR-FPC/FFC/PIC;33P,1.25MM,STRAIGH	1	SA	
CN02	3708-000270	CONNECTOR-FPC/FFC/PIC;33P,1.25MM,STRAIGH	1	SA	
CN03	3711-004379	HEADER-BOARD TO CABLE;BOX,4P,1R,2MM,STRA	1	SA	
CN04	3711-000827	HEADER-BOARD TO CABLE;BOX,2P,1R,2mm,STRA	1	SA	
CN1S01	3711-000203	HEADER-BOARD TO CABLE;1WALL,2P/3P,1R,7.9	1	SA	
CN301	3708-000391	CONNECTOR-FPC/FFC/PIC;10P,1.25mm,STRAIGH	1	SA	
CN302	AC37-00028A	CONNECTOR-SOCKET;-,X-11,T9.0,W8.5,PBT NT	1	SA	
CN303	3708-001165	CONNECTOR-FPC/FFC/PIC;6P,1.25MM,STRAIGHT	1	SA	
CN701	3708-001963	CONNECTOR-FPC/FFC/PIC;8P,1.25MM,STRAIGHT	1	SA	
CN702	3708-001372	CONNECTOR-FPC/FFC/PIC;8P,1.25MM,ANGLE,SN	1	SA	
D1	0402-001111	DIODE-RECTIFIER;1N5397GP,600V,1.5A,-,TP	1	SA	
D1P101	0401-000005	DIODE-SWITCHING;1N4148,75V,150MA,DO-35,T	1	SA	
D1P102	0401-000005	DIODE-SWITCHING;1N4148,75V,150MA,DO-35,T	1	SA	
D1P103	0401-000005	DIODE-SWITCHING;1N4148,75V,150MA,DO-35,T	1	SA	
D1P105	0402-000127	DIODE-RECTIFIER;1N4002,100V,1A,DO-41,TP	1	SA	
D1P106	0402-000127	DIODE-RECTIFIER;1N4002,100V,1A,DO-41,TP	1	SA	
D1P107	0402-000127	DIODE-RECTIFIER;1N4002,100V,1A,DO-41,TP	1	SA	
D1P108	0402-000165	DIODE-RECTIFIER;1N5819,40V,1A,DO-41,TP	1	SA	
D1P110	0402-000127	DIODE-RECTIFIER;1N4002,100V,1A,DO-41,TP	1	SA	
D1P111	0402-000127	DIODE-RECTIFIER;1N4002,100V,1A,DO-41,TP	1	SA	
D1P112	0401-000005	DIODE-SWITCHING;1N4148,75V,150MA,DO-35,T	1	SA	
D1P114	0401-000005	DIODE-SWITCHING;1N4148,75V,150MA,DO-35,T	1	SA	
D1S01	0402-001194	DIODE-RECTIFIER;SHG2D,200V,2A,-,TP	1	SA	
D1S05	0402-000012	DIODE-RECTIFIER;UF4007,1KV,1A,DO-41,TP	1	SA	
D1S06	0401-000005	DIODE-SWITCHING;1N4148,75V,150MA,DO-35,T	1	SA	
D1S07	0402-001195	DIODE-RECTIFIER;F1T4,400V,1A,DO-204AC,TP	1	SA	
D1S32	0402-001643	DIODE-RECTIFIER;MBRF10A0,100V,10A,ITO-22	1	SA	
D1S33	0402-001643	DIODE-RECTIFIER;MBRF10A0,100V,10A,ITO-22	1	SA	
D1S34	0402-001195	DIODE-RECTIFIER;F1T4,400V,1A,DO-204AC,TP	1	SA	
D1S35	0402-001194	DIODE-RECTIFIER;SHG2D,200V,2A,-,TP	1	SA	
D1S37	0402-001195	DIODE-RECTIFIER;F1T4,400V,1A,DO-204AC,TP	1	SA	
D1S39	0401-000005	DIODE-SWITCHING;1N4148,75V,150MA,DO-35,T	1	SA	
D2	0402-001111	DIODE-RECTIFIER;1N5397GP,600V,1.5A,-,TP	1	SA	
D3	0402-001111	DIODE-RECTIFIER;1N5397GP,600V,1.5A,-,TP	1	SA	
D4	0402-001111	DIODE-RECTIFIER;1N5397GP,600V,1.5A,-,TP	1	SA	
D601	0401-000005	DIODE-SWITCHING;1N4148,75V,150MA,DO-35,T	1	SA	
D605	0401-000005	DIODE-SWITCHING;1N4148,75V,150MA,DO-35,T	1	SA	
D701	0401-000005	DIODE-SWITCHING;1N4148,75V,150MA,DO-35,T	1	SA	
D702	0401-000005	DIODE-SWITCHING;1N4148,75V,150MA,DO-35,T	1	SA	
D703	0401-000005	DIODE-SWITCHING;1N4148,75V,150MA,DO-35,T	1	SA	
D704	0401-000005	DIODE-SWITCHING;1N4148,75V,150MA,DO-35,T	1	SA	

Loc.No	Part No	Description ; Specification	Q'ty	S.N.A	Remark
D705	0401-000005	DIODE-SWITCHING;1N4148,75V,150MA,DO-35,T	1	SA	
DT701	AK07-00031A	LED DISPLAY;BCD-9033A,DVD-VR320,70,10,7,	1	SA	
F1S01	3601-001122	FUSE-CARTRIDGE;250V,1.6A,FAST-ACTING,GLA	1	SA	
FL042	3809-001206	CABLE-FLAT;30V,80C,140MM,6P,1.25MM,UL289	1	SA	
FL258	3809-001679	FFC CABLE-FLAT;30V,80,90MM,8P,1.25MM,UL2	1	SA	
FL282	3809-001581	FFC CABLE-FLAT;30V,80C,60mm,33P,1.25mm,U	1	SA	
FL282	3809-001581	FFC CABLE-FLAT;30V,80C,60mm,33P,1.25mm,U	1	SA	
IC1P01	1203-000242	IC-POSI.FIXED REG.;7812,TO-220,3P,-,PLAS	1	SA	
IC1P02	AC14-12006N	IC-VOLT REGU;KA78R12,SIP,STICK	1	SA	
IC1P03	1203-003216	IC-POSI.FIXED REG.;G9133,TO-220F,4P,10.1	1	SA	
IC1S01	1203-002805	IC-PWM CONTROLLER;ICE2BS01,PDIP,8P,9.52X	1	SA	
IC1S02	0604-001028	PHOTO-COUPLER;TR,50-600%,250mW,DIP-4,ST	1	SA	
IC1S03	AC14-12006D	IC;KA431Z,TO-92,TAPING	1	SA	
IC301	1204-001952	IC-VIDEO PROCESS;LA71207,QFP,80P,14X14MM	1	SA	
IC501	1204-002222	IC-SIGNAL PROCESSOR;LA72670M-MPB,QFP,80P	1	SA	
IC601	AC09-00565A	IC MICOM;MN101D10G-BD,DVD-VR320,100PIN,	1	SA	
IC603	1103-001330	IC-EEPROM;S524A40X41,512x8Bit,DIP,8P,9.2	1	SA	
IC6B1	AC14-12006C	IC;KA7533,DIP,-	1	SA	
IC701	1003-001443	IC-LED DRIVER;PT6959,SOIC,28P,300MIL,-,-	1	SA	
J605	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
L1P02	2701-000002	INDUCTOR-AXIAL;100UH,10%,4298	1	SA	
L1P101	2701-000002	INDUCTOR-AXIAL;100UH,10%,4298	1	SA	
L1S02	AK29-00002A	FILTER EMI;RECORDER,SQ2222,0.42Ohm Max,1	1	SA	
L1S30	AH27-00039A	COIL CHOKE;DR CHOKE(8*6),DVD-R2000,22uH,	1	SA	
L1S31	AH27-00039A	COIL CHOKE;DR CHOKE(8*6),DVD-R2000,22uH,	1	SA	
L1S32	AC27-12001N	COIL CHOKE;10UH-15%,RA,K-30,Q80,150KHZ,-	1	SA	
L301	AC27-92001M	COIL-INDUCTOR;RH3.5X6.5RS,BEAD(RADIAL),-	1	SA	
L302	3301-000297	BEAD-AXIAL;25ohm,3.6x1.2x5.7mm,-,TP,-,-,	1	SA	
L303	3301-000297	BEAD-AXIAL;25ohm,3.6x1.2x5.7mm,-,TP,-,-,	1	SA	
L304	3301-000297	BEAD-AXIAL;25ohm,3.6x1.2x5.7mm,-,TP,-,-,	1	SA	
L305	AC27-92001M	COIL-INDUCTOR;RH3.5X6.5RS,BEAD(RADIAL),-	1	SA	
L306	2702-000120	INDUCTOR-RADIAL;15000uH,5%,6.2x7.4mm	1	SA	
L307	2701-000002	INDUCTOR-AXIAL;100UH,10%,4298	1	SA	
L308	2702-000166	INDUCTOR-RADIAL;47uH,5%,6.0x6.4mm	1	SA	
L502	3301-000297	BEAD-AXIAL;25ohm,3.6x1.2x5.7mm,-,TP,-,-,	1	SA	
L503	3301-000297	BEAD-AXIAL;25ohm,3.6x1.2x5.7mm,-,TP,-,-,	1	SA	
L601	2702-000108	INDUCTOR-RADIAL;100uH,5%,6.0x6.4mm	1	SA	
L602	2701-000002	INDUCTOR-AXIAL;100UH,10%,4298	1	SA	
L603	2701-000002	INDUCTOR-AXIAL;100UH,10%,4298	1	SA	
L604	2701-000002	INDUCTOR-AXIAL;100UH,10%,4298	1	SA	
L701	2701-000002	INDUCTOR-AXIAL;100UH,10%,4298	1	SA	
P022	AC37-00027A	CONNECTOR-HEADER;20045WS,X-11,T8.5,W17.4	1	SA	
PT1SD1	AC26-00014C	TRANS SWITCHING;EER-3534,RAM COMBO,-,FRE	1	SA	
PT601	0604-001275	PHOTO-INTERRUPTER;-,-,0MW,SNAP(STOPPER),	1	SA	
PT602	0604-001275	PHOTO-INTERRUPTER;-,-,0MW,SNAP(STOPPER),	1	SA	
Q1P101	0501-000362	TR-SMALL SIGNAL;KSC2328A-Y,NPN,1000mW,TO	1	SA	
Q1P102	0501-000362	TR-SMALL SIGNAL;KSC2328A-Y,NPN,1000mW,TO	1	SA	
Q1P103	0501-000362	TR-SMALL SIGNAL;KSC2328A-Y,NPN,1000mW,TO	1	SA	
Q1P104	0501-000398	TR-SMALL SIGNAL;KSC945,NPN,250mW,TO-92,T	1	SA	
Q1P105	0501-000362	TR-SMALL SIGNAL;KSC2328A-Y,NPN,1000mW,TO	1	SA	
Q1P106	0504-000142	TR-DIGITAL;KSR2001,PNP,300MW,4.7K/4.7K,T	1	SA	
Q1P107	0501-000398	TR-SMALL SIGNAL;KSC945,NPN,250mW,TO-92,T	1	SA	
Q1P108	0501-000362	TR-SMALL SIGNAL;KSC2328A-Y,NPN,1000mW,TO	1	SA	
Q1P109	0501-000362	TR-SMALL SIGNAL;KSC2328A-Y,NPN,1000mW,TO	1	SA	
Q1P110	0501-000362	TR-SMALL SIGNAL;KSC2328A-Y,NPN,1000mW,TO	1	SA	

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Q1P111	0501-000610	TR-SMALL SIGNAL;KSA928A-Y,PNP,1W,TO-92L,	1	SA	
Q1P112	0501-000610	TR-SMALL SIGNAL;KSA928A-Y,PNP,1W,TO-92L,	1	SA	
Q1P113	0501-000610	TR-SMALL SIGNAL;KSA928A-Y,PNP,1W,TO-92L,	1	SA	
Q1P114	0501-000362	TR-SMALL SIGNAL;KSC2328A-Y,NPN,1000mW,TO	1	SA	
Q1S01	0505-001729	FET-SILICON;SPA04N60C3,N,600V,4.5A,0.85O	1	SA	
Q302	0501-000002	TR-SMALL SIGNAL;KSA812,PNP,150MW,SOT-23,	1	SA	
Q303	0501-000341	TR-SMALL SIGNAL;KSC1623-L,NPN,200mW,SOT-	1	SA	
Q304	0501-000002	TR-SMALL SIGNAL;KSA812,PNP,150MW,SOT-23,	1	SA	
Q305	0501-000442	TR-SMALL SIGNAL;KTC3203-Y,NPN,400mW,T0-9	1	SA	
Q306	0501-000002	TR-SMALL SIGNAL;KSA812,PNP,150MW,SOT-23,	1	SA	
Q307	0501-000442	TR-SMALL SIGNAL;KTC3203-Y,NPN,400mW,T0-9	1	SA	
Q308	0501-000442	TR-SMALL SIGNAL;KTC3203-Y,NPN,400mW,T0-9	1	SA	
Q601	0504-000129	TR-DIGITAL;KSR1104,NPN,200mW,47K/47K,SOT	1	SA	
R1P101	2001-000429	R-CARBON;1KOHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
R1P102	2001-000008	R-CARBON;15KOHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
R1P103	2007-000084	R-CHIP;4.7Kohm,5%,1/10W,TP,1608	1	SA	
R1P104	2001-000281	R-CARBON;100OHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
R1P105	2001-000605	R-CARBON;3.6KOHM,5%,1/8W,AA,TP,1.8X3.2M	1	SA	
R1P114	2001-000062	R-CARBON;470OHM,5%,1/4W,AA,TP,2.4X6.4MM	1	SA	
R1P115	2001-000062	R-CARBON;470OHM,5%,1/4W,AA,TP,2.4X6.4MM	1	SA	
R1P121	2001-000111	R-CARBON;150OHM,5%,1/4W,AA,TP,2.4X6.4MM	1	SA	
R1P122	2001-000449	R-CARBON;2.2KOHM,5%,1/8W,AA,TP,1.8X3.2M	1	SA	
R1P123	2001-000613	R-CARBON;3.9KOHM,5%,1/8W,AA,TP,1.8X3.2M	1	SA	
R1P124	2001-000062	R-CARBON;470OHM,5%,1/4W,AA,TP,2.4X6.4MM	1	SA	
R1P125	2001-000449	R-CARBON;2.2KOHM,5%,1/8W,AA,TP,1.8X3.2M	1	SA	
R1P126	2001-000290	R-CARBON;10KOHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
R1P127	2001-000290	R-CARBON;10KOHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
R1P128	2001-000449	R-CARBON;2.2KOHM,5%,1/8W,AA,TP,1.8X3.2M	1	SA	
R1P131	2001-000855	R-CARBON;560OHM,5%,1/4W,AA,TP,2.4X6.4MM	1	SA	
R1S02	2006-000273	R-CEMENT;27KOHM,5%,2W,CA,BK,6.4X6.5X18M	1	SA	
R1S03	2006-000273	R-CEMENT;27KOHM,5%,2W,CA,BK,6.4X6.5X18M	1	SA	
R1S04	1404-001361	THERMISTOR-NTC;3ohm,4A,-,35mW/C,-,9,TP	1	SA	
R1S05	2001-000546	R-CARBON;270KOHM,5%,1/4W,AA,TP,2.4X6.4M	1	SA	
R1S06	2001-000869	R-CARBON;56OHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
R1S07	2001-000546	R-CARBON;270KOHM,5%,1/4W,AA,TP,2.4X6.4M	1	SA	
R1S08	2001-000546	R-CARBON;270KOHM,5%,1/4W,AA,TP,2.4X6.4M	1	SA	
R1S09	2001-000598	R-CARBON;3.3OHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
R1S10	2001-000281	R-CARBON;100OHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
R1S11	2001-000449	R-CARBON;2.2KOHM,5%,1/8W,AA,TP,1.8X3.2M	1	SA	
R1S12	2001-000527	R-CARBON;22OHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
R1S13	2005-001198	R-WIRE WOUND,NON;0.18ohm,1%,1W,AA,TP,4.3	1	SA	
R1S14	2001-000290	R-CARBON;10KOHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
R1S15	2002-000121	R-COMPOSITION;1Mohm,10%,1/2W,AA,TP,3.5x9	1	SA	
R1S31	2001-000780	R-CARBON;470OHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
R1S32	2001-000221	R-CARBON;1.2KOHM,5%,1/8W,AA,TP,1.8X3.2M	1	SA	
R1S33	2001-000429	R-CARBON;1KOHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
R1S35	2004-000500	R-METAL;2.7Kohm,1%,1/8W,AA,TP,1.8x3.2m	1	SA	
R1S36	2007-000491	R-CHIP;2.2Kohm,1%,1/10W,TP,1608	1	SA	
R1S37	2003-000148	R-METAL OXIDE;100ohm,5%,2W,AE,TP,6x16mm	1	SA	
R301	2007-000092	R-CHIP;15Kohm,5%,1/10W,TP,1608	1	SA	
R302	2007-001056	R-CHIP;6.2Kohm,5%,1/10W,TP,1608	1	SA	
R303	2007-000079	R-CHIP;1.8Kohm,5%,1/10W,TP,1608	1	SA	
R304	2007-000079	R-CHIP;1.8Kohm,5%,1/10W,TP,1608	1	SA	
R305	2001-000734	R-CARBON;4.7KOHM,5%,1/8W,AA,TP,1.8X3.2M	1	SA	
R306	2001-000362	R-CARBON;150OHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	

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R308	2007-000106	R-CHIP;220Kohm,5%,1/10W,TP,1608	1	SA	
R309	2007-000105	R-CHIP;200Kohm,5%,1/10W,TP,1608	1	SA	
R310	2007-000124	R-CHIP;2.2Kohm,5%,1/10W,TP,1608	1	SA	
R311	2007-001114	R-CHIP;680Kohm,5%,1/10W,TP,1608	1	SA	
R312	2007-000122	R-CHIP;1.2Kohm,5%,1/10W,TP,1608	1	SA	
R313	2001-000258	R-CARBON;1.8KOHM,5%,1/8W,AA,TP,1.8X3.2M	1	SA	
R314	2007-000123	R-CHIP;1.5Kohm,5%,1/10W,TP,1608	1	SA	
R315	2007-001179	R-CHIP;8.2Kohm,5%,1/10W,TP,1608	1	SA	
R316	2001-000290	R-CARBON;10KOHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
R317	2001-000387	R-CARBON;16KOHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
R318	2001-000387	R-CARBON;16KOHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
R319	2001-000290	R-CARBON;10KOHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
R320	2007-000079	R-CHIP;1.8Kohm,5%,1/10W,TP,1608	1	SA	
R322	2007-000082	R-CHIP;3.3Kohm,5%,1/10W,TP,1608	1	SA	
R326	2007-000122	R-CHIP;1.2Kohm,5%,1/10W,TP,1608	1	SA	
R327	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
R328	2007-000127	R-CHIP;9.1Kohm,5%,1/10W,TP,1608	1	SA	
R329	2007-000133	R-CHIP;330Kohm,5%,1/10W,TP,1608	1	SA	
R330	2007-000402	R-CHIP;150ohm,5%,1/10W,TP,1608	1	SA	
R331	2007-000129	R-CHIP;27Kohm,5%,1/10W,TP,1608	1	SA	
R332	2007-000078	R-CHIP;1Kohm,5%,1/10W,TP,1608	1	SA	
R333	2001-000221	R-CARBON;1.2KOHM,5%,1/8W,AA,TP,1.8X3.2M	1	SA	
R334	2007-000094	R-CHIP;22Kohm,5%,1/10W,TP,1608	1	SA	
R335	2007-000097	R-CHIP;47Kohm,5%,1/10W,TP,1608	1	SA	
R336	2007-000090	R-CHIP;10Kohm,5%,1/10W,TP,1608	1	SA	
R338	2007-000074	R-CHIP;100ohm,5%,1/10W,TP,1608	1	SA	
R339	2007-000124	R-CHIP;2.2Kohm,5%,1/10W,TP,1608	1	SA	
R340	2007-000124	R-CHIP;2.2Kohm,5%,1/10W,TP,1608	1	SA	
R341	2001-000522	R-CARBON;22KOHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
R342	2007-000090	R-CHIP;10Kohm,5%,1/10W,TP,1608	1	SA	
R343	2007-001002	R-CHIP;510ohm,5%,1/10W,TP,1608	1	SA	
R344	2007-001002	R-CHIP;510ohm,5%,1/10W,TP,1608	1	SA	
R348	2007-000086	R-CHIP;5.6Kohm,5%,1/10W,TP,1608	1	SA	
R350	2007-000079	R-CHIP;1.8Kohm,5%,1/10W,TP,1608	1	SA	
R3D05	2007-000124	R-CHIP;2.2Kohm,5%,1/10W,TP,1608	1	SA	
R3D06	2001-000800	R-CARBON;5.1KOHM,5%,1/8W,AA,TP,1.8X3.2M	1	SA	
R506	2007-000077	R-CHIP;470ohm,5%,1/10W,TP,1608	1	SA	
R507	2007-000081	R-CHIP;2.7Kohm,5%,1/10W,TP,1608	1	SA	
R508	2007-000130	R-CHIP;39Kohm,5%,1/10W,TP,1608	1	SA	
R509	2001-000780	R-CARBON;470OHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
R510	2001-000780	R-CARBON;470OHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
R516	2007-000078	R-CHIP;1Kohm,5%,1/10W,TP,1608	1	SA	
R517	2007-000078	R-CHIP;1Kohm,5%,1/10W,TP,1608	1	SA	
R523	2001-000947	R-CARBON;7.5KOHM,5%,1/8W,AA,TP,1.8X3.2M	1	SA	
R524	2001-000786	R-CARBON;47KOHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
R525	2001-000786	R-CARBON;47KOHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
R526	2007-000088	R-CHIP;7.5Kohm,5%,1/10W,TP,1608	1	SA	
R527	2007-000091	R-CHIP;12Kohm,5%,1/10W,TP,1608	1	SA	
R528	2007-000805	R-CHIP;36Kohm,5%,1/10W,TP,1608	1	SA	
R601	2007-000094	R-CHIP;22Kohm,5%,1/10W,TP,1608	1	SA	
R602	2001-000515	R-CARBON;220OHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
R603	2007-000094	R-CHIP;22Kohm,5%,1/10W,TP,1608	1	SA	
R604	2001-000515	R-CARBON;220OHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
R606	2001-000633	R-CARBON;30KOHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
R609	2007-000078	R-CHIP;1Kohm,5%,1/10W,TP,1608	1	SA	

Loc.No	Part No	Description ; Specification	Q'ty	S.N.A	Remark
R611	2007-000081	R-CHIP;2.7Kohm,5%,1/10W,TP,1608	1	SA	
R613	2007-000090	R-CHIP;10Kohm,5%,1/10W,TP,1608	1	SA	
R614	2001-000429	R-CARBON;1KOHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
R615	2007-000086	R-CHIP;5.6Kohm,5%,1/10W,TP,1608	1	SA	
R616	2001-000429	R-CARBON;1KOHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
R617	2007-000122	R-CHIP;1.2Kohm,5%,1/10W,TP,1608	1	SA	
R618	2007-000098	R-CHIP;56Kohm,5%,1/10W,TP,1608	1	SA	
R619	2001-000290	R-CARBON;10KOHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
R621	2001-000780	R-CARBON;470OHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
R622	2001-000780	R-CARBON;470OHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
R623	2007-000084	R-CHIP;4.7Kohm,5%,1/10W,TP,1608	1	SA	
R624	2007-000084	R-CHIP;4.7Kohm,5%,1/10W,TP,1608	1	SA	
R630	2007-000098	R-CHIP;56Kohm,5%,1/10W,TP,1608	1	SA	
R631	2007-000098	R-CHIP;56Kohm,5%,1/10W,TP,1608	1	SA	
R632	2007-000097	R-CHIP;47Kohm,5%,1/10W,TP,1608	1	SA	
R634	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
R636	2007-000078	R-CHIP;1Kohm,5%,1/10W,TP,1608	1	SA	
R638	2007-000082	R-CHIP;3.3Kohm,5%,1/10W,TP,1608	1	SA	
R639	2007-000081	R-CHIP;2.7Kohm,5%,1/10W,TP,1608	1	SA	
R641	2001-000290	R-CARBON;10KOHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
R643	2007-000090	R-CHIP;10Kohm,5%,1/10W,TP,1608	1	SA	
R644	2007-000090	R-CHIP;10Kohm,5%,1/10W,TP,1608	1	SA	
R645	2007-000090	R-CHIP;10Kohm,5%,1/10W,TP,1608	1	SA	
R646	2007-000086	R-CHIP;5.6Kohm,5%,1/10W,TP,1608	1	SA	
R647	2007-000076	R-CHIP;330ohm,5%,1/10W,TP,1608	1	SA	
R648	2007-000076	R-CHIP;330ohm,5%,1/10W,TP,1608	1	SA	
R649	2007-000084	R-CHIP;4.7Kohm,5%,1/10W,TP,1608	1	SA	
R650	2007-000084	R-CHIP;4.7Kohm,5%,1/10W,TP,1608	1	SA	
R651	2007-000084	R-CHIP;4.7Kohm,5%,1/10W,TP,1608	1	SA	
R652	2001-000290	R-CARBON;10KOHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
R653	2007-000078	R-CHIP;1Kohm,5%,1/10W,TP,1608	1	SA	
R656	2007-000090	R-CHIP;10Kohm,5%,1/10W,TP,1608	1	SA	
R659	2001-000429	R-CARBON;1KOHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
R660	2007-000100	R-CHIP;68Kohm,5%,1/10W,TP,1608	1	SA	
R661	2007-000078	R-CHIP;1Kohm,5%,1/10W,TP,1608	1	SA	
R662	2001-000290	R-CARBON;10KOHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
R663	2001-000429	R-CARBON;1KOHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
R664	2001-000429	R-CARBON;1KOHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
R666	2007-000074	R-CHIP;100ohm,5%,1/10W,TP,1608	1	SA	
R667	2007-000074	R-CHIP;100ohm,5%,1/10W,TP,1608	1	SA	
R668	2007-000078	R-CHIP;1Kohm,5%,1/10W,TP,1608	1	SA	
R669	2007-000074	R-CHIP;100ohm,5%,1/10W,TP,1608	1	SA	
R670	2007-000074	R-CHIP;100ohm,5%,1/10W,TP,1608	1	SA	
R671	2007-000074	R-CHIP;100ohm,5%,1/10W,TP,1608	1	SA	
R673	2001-000429	R-CARBON;1KOHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
R676	2001-000429	R-CARBON;1KOHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
R677	2001-000429	R-CARBON;1KOHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
R678	2007-000078	R-CHIP;1Kohm,5%,1/10W,TP,1608	1	SA	
R679	2007-000078	R-CHIP;1Kohm,5%,1/10W,TP,1608	1	SA	
R680	2007-000078	R-CHIP;1Kohm,5%,1/10W,TP,1608	1	SA	
R681	2001-000273	R-CARBON;100KOHM,5%,1/8W,AA,TP,1.8X3.2M	1	SA	
R690	2001-000429	R-CARBON;1KOHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
R691	2001-000429	R-CARBON;1KOHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
R692	2001-000429	R-CARBON;1KOHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
R694	2007-000078	R-CHIP;1Kohm,5%,1/10W,TP,1608	1	SA	

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R695	2001-000429	R-CARBON;1KOHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
R6A01	2001-000273	R-CARBON;100KOHM,5%,1/8W,AA,TP,1.8X3.2M	1	SA	
R701	2001-000429	R-CARBON;1KOHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
R702	2001-000008	R-CARBON;15KOHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
R703	2001-000429	R-CARBON;1KOHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
R704	2007-000092	R-CHIP;15Kohm,5%,1/10W,TP,1608	1	SA	
R705	2001-000429	R-CARBON;1KOHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
R706	2001-000008	R-CARBON;15KOHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
R707	2001-000429	R-CARBON;1KOHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
R708	2001-000008	R-CARBON;15KOHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
R710	2007-000076	R-CHIP;330ohm,5%,1/10W,TP,1608	1	SA	
R711	2007-000090	R-CHIP;10Kohm,5%,1/10W,TP,1608	1	SA	
R712	2007-001010	R-CHIP;51Kohm,5%,1/10W,TP,1608	1	SA	
R719	2001-000429	R-CARBON;1KOHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
RM701	0609-001198	MODULE REMOCON;VERTICAL,19MM,TR	1	SA	
SW602	AC34-00006A	SWITCH-REC;-,-,-,-,-,-,-,-,-,-,-,-,-,-,-,-	1	SA	
SW603	AC34-00005A	SWITCH MODE;-,-,-,-,-,-,-,-,-,-,-,-,-,-,-,	1	SA	
SW604	3409-001165	SWITCH-DETECTOR;5V,1mA,-,50gf,ON-OFF	1	SA	
SW701	3404-001182	SWITCH-TACT;DC12V,50MA,100GF,6.0X6.0X5.0	1	SA	
SW702	3404-001182	SWITCH-TACT;DC12V,50MA,100GF,6.0X6.0X5.0	1	SA	
SW703	3404-001182	SWITCH-TACT;DC12V,50MA,100GF,6.0X6.0X5.0	1	SA	
SW704	3404-001182	SWITCH-TACT;DC12V,50MA,100GF,6.0X6.0X5.0	1	SA	
SW705	3404-001182	SWITCH-TACT;DC12V,50MA,100GF,6.0X6.0X5.0	1	SA	
SW706	3404-001182	SWITCH-TACT;DC12V,50MA,100GF,6.0X6.0X5.0	1	SA	
SW707	3404-001182	SWITCH-TACT;DC12V,50MA,100GF,6.0X6.0X5.0	1	SA	
SW708	3404-001182	SWITCH-TACT;DC12V,50MA,100GF,6.0X6.0X5.0	1	SA	
SW709	3404-001182	SWITCH-TACT;DC12V,50MA,100GF,6.0X6.0X5.0	1	SA	
SW710	3404-001182	SWITCH-TACT;DC12V,50MA,100GF,6.0X6.0X5.0	1	SA	
SW711	3404-001182	SWITCH-TACT;DC12V,50MA,100GF,6.0X6.0X5.0	1	SA	
SW712	3404-001182	SWITCH-TACT;DC12V,50MA,100GF,6.0X6.0X5.0	1	SA	
SW718	3404-001182	SWITCH-TACT;DC12V,50MA,100GF,6.0X6.0X5.0	1	SA	
VA1S01	1405-001026	VARISTOR;470V,600A,9x7mm,TP	1	SA	
W004	6003-000283	SCREW-TAPTITE;BH,+,B,M3,L8,ZPC(YEL),SWRC	1	SA	
W004	6003-000283	SCREW-TAPTITE;BH,+,B,M3,L8,ZPC(YEL),SWRC	1	SA	
W004	6003-000283	SCREW-TAPTITE;BH,+,B,M3,L8,ZPC(YEL),SWRC	1	SA	
XT301	2801-003399	CRYSTAL-UNIT;3.579545MHz,15ppm,28-AAA,S,	1	SA	
ZD1P02	0403-001211	DIODE-ZENER;MTZJ12B,11.8-12.3V,500MW,DO-	1	SA	
ZD1P03	0403-000720	DIODE-ZENER;MTZJ9.1B,8.57-9.01V,500MW,DO	1	SA	
ZD1P04	0403-000717	DIODE-ZENER;MTZJ5.1B,4.94-5.2V,500mW,DO-	1	SA	
ZD1P05	0403-000717	DIODE-ZENER;MTZJ5.1B,4.94-5.2V,500mW,DO-	1	SA	
ZD1P06	0403-000717	DIODE-ZENER;MTZJ5.1B,4.94-5.2V,500mW,DO-	1	SA	
ZD1S01	0403-001318	DIODE-ZENER;MTZJ4.3B,4.17-4.43V,500MW,DO	1	SA	
ZD1S02	0403-000713	DIODE-ZENER;MTZJ20B,18.63-17.7V,500MW,DO	1	SA	
ZD401	0403-000390	DIODE-ZENER;UZP33B,31.4-34.6V,1000MW,DO-	1	SA	
P002	**AK92-00752A**	**ASSY PCB-MAIN DVD;DVD-VR320A/XAA,SEC,TW**	**1**	**SA**	
AC104	2402-001059	C-AL,SMD;220UF,20%,6.3V,-,TP,6X6.6X6.6	1	SA	
AC105	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
AC7	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
AC816	2203-000236	C-CER,CHIP;0.1NF,5%,50V,C0G,TP,1608	1	SA	
AC818	2203-000236	C-CER,CHIP;0.1NF,5%,50V,C0G,TP,1608	1	SA	
AC820	2203-000783	C-CER,CHIP;0.33NF,5%,50V,C0G,TP,1608	1	SA	
AC821	2203-001554	C-CER,CHIP;1.8nF,10%,50V,X7R,TP,1608	1	SA	
AC822	2402-000176	C-AL,SMD;10uF,20%,16V,GP,TP,4.3x4.3x5.4	1	SA	

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AC823	2203-000783	C-CER,CHIP;0.33NF,5%,50V,C0G,TP,1608	1	SA	
AC824	2203-001554	C-CER,CHIP;1.8nF,10%,50V,X7R,TP,1608	1	SA	
AC831	2402-000176	C-AL,SMD;10uF,20%,16V,GP,TP,4.3x4.3x5.4	1	SA	
AC891	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
AC892	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
AC908	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
AC911	2402-000176	C-AL,SMD;10uF,20%,16V,GP,TP,4.3x4.3x5.4	1	SA	
AC912	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
AC913	2402-000007	C-AL,SMD;22uF,20%,6.3V,GP,TP,4.3x4.3x5.	1	SA	
AC914	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
AC915	2402-000176	C-AL,SMD;10uF,20%,16V,GP,TP,4.3x4.3x5.4	1	SA	
AC917	2402-000176	C-AL,SMD;10uF,20%,16V,GP,TP,4.3x4.3x5.4	1	SA	
AC918	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
AC919	2402-001096	C-AL,SMD;220UF,20%,16V,GP,TP,6.6X6.6X7.	1	SA	
AE1	2402-001059	C-AL,SMD;220UF,20%,6.3V,-,TP,6X6.6X6.6	1	SA	
AE3	2402-001096	C-AL,SMD;220UF,20%,16V,GP,TP,6.6X6.6X7.	1	SA	
AIC1	1002-001395	IC-D/A CONVERTER;PCM1753,24Bit,SSOP,16P,	1	SA	
AIC81	1201-000163	IC-OP AMP;4560,SOP,8P,173MIL,DUAL,100V/m	1	SA	
AIC82	1201-000163	IC-OP AMP;4560,SOP,8P,173MIL,DUAL,100V/m	1	SA	
AIC9	1002-001387	IC-A/D CONVERTER;PCM1802,24BIT,SSOP,20P,	1	SA	
AL2	3301-001419	BEAD-SMD;220ohm,1608,500mA,TP,133ohm/70	1	SA	
AL3	3301-001419	BEAD-SMD;220ohm,1608,500mA,TP,133ohm/70	1	SA	
AL4	3301-001419	BEAD-SMD;220ohm,1608,500mA,TP,133ohm/70	1	SA	
AR801	2007-000084	R-CHIP;4.7Kohm,5%,1/10W,TP,1608	1	SA	
AR802	2007-000084	R-CHIP;4.7Kohm,5%,1/10W,TP,1608	1	SA	
AR803	2007-000084	R-CHIP;4.7Kohm,5%,1/10W,TP,1608	1	SA	
AR804	2007-000082	R-CHIP;3.3Kohm,5%,1/10W,TP,1608	1	SA	
AR805	2007-000122	R-CHIP;1.2Kohm,5%,1/10W,TP,1608	1	SA	
AR806	2007-000084	R-CHIP;4.7Kohm,5%,1/10W,TP,1608	1	SA	
AR807	2007-000122	R-CHIP;1.2Kohm,5%,1/10W,TP,1608	1	SA	
AR808	2007-000082	R-CHIP;3.3Kohm,5%,1/10W,TP,1608	1	SA	
AR809	2007-000080	R-CHIP;2Kohm,5%,1/10W,TP,1608	1	SA	
AR810	2007-000080	R-CHIP;2Kohm,5%,1/10W,TP,1608	1	SA	
AR812	2007-000080	R-CHIP;2Kohm,5%,1/10W,TP,1608	1	SA	
AR813	2007-000084	R-CHIP;4.7Kohm,5%,1/10W,TP,1608	1	SA	
AR814	2007-000084	R-CHIP;4.7Kohm,5%,1/10W,TP,1608	1	SA	
AR881	2007-000102	R-CHIP;100Kohm,5%,1/10W,TP,1608	1	SA	
AR882	2007-000102	R-CHIP;100Kohm,5%,1/10W,TP,1608	1	SA	
AR894	2007-000102	R-CHIP;100Kohm,5%,1/10W,TP,1608	1	SA	
AR895	2007-000102	R-CHIP;100Kohm,5%,1/10W,TP,1608	1	SA	
C1	2203-000384	C-CER,CHIP;0.015NF,5%,50V,C0G,TP,1608	1	SA	
C10	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C11	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C119	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C12	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C13	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C14	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C15	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C16	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C17	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C18	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C19	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C2	2203-000426	C-CER,CHIP;0.018NF,5%,50V,C0G,TP,1608	1	SA	
C20	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C21	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	

Loc.No	Part No	Description ; Specification	Q'ty	S.N.A	Remark
C22	2203-001554	C-CER,CHIP;1.8nF,10%,50V,X7R,TP,1608	1	SA	
C23	2203-001554	C-CER,CHIP;1.8nF,10%,50V,X7R,TP,1608	1	SA	
C24	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C25	2203-001554	C-CER,CHIP;1.8nF,10%,50V,X7R,TP,1608	1	SA	
C26	2203-001554	C-CER,CHIP;1.8nF,10%,50V,X7R,TP,1608	1	SA	
C27	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C28	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C29	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C3	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C30	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C31	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C32	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C33	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C34	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C35	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C36	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C37	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C38	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C39	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C4	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C40	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C41	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C42	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C43	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C44	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C48	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C49	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C5	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C50	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C51	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C52	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C53	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C54	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C55	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C56	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C57	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C58	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C59	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C6	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C60	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C61	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C62	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C63	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C64	2203-000440	C-CER,CHIP;1nF,10%,50V,X7R,TP,1608,-	1	SA	
C65	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C66	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C67	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C68	2203-000440	C-CER,CHIP;1nF,10%,50V,X7R,TP,1608,-	1	SA	
C69	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C7	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C70	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C71	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C72	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C73	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C74	2203-000440	C-CER,CHIP;1nF,10%,50V,X7R,TP,1608,-	1	SA	
C75	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C76	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C77	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C78	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C79	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C8	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C80	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C81	2203-000440	C-CER,CHIP;1nF,10%,50V,X7R,TP,1608,-	1	SA	
C82	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C83	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C84	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C85	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C86	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C87	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C89	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C9	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C90	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C91	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C92	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C93	2203-000975	C-CER,CHIP;47nF,10%,25V,X7R,TP,1608,-	1	SA	
C94	2203-000659	C-CER,CHIP;0.27NF,5%,50V,C0G,TP,1608	1	SA	
C95	2203-000315	C-CER,CHIP;0.12NF,5%,50V,C0G,TP,1608	1	SA	
CC1	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
CN1	3710-002075	CONNECTOR-SOCKET;30P,2R,2MM,SMD,SnPb,BLK	1	SA	
CN2	3710-002075	CONNECTOR-SOCKET;30P,2R,2MM,SMD,SnPb,BLK	1	SA	
CN3	3711-005595	CONNECTOR-SOCKET;12P,2R,2MM,SMD-S,-,BLK	1	SA	
CN5	3708-001935	CONNECTOR-FPC/FFC/PIC;40P,0.5mm,SMD-S,Sn	1	SA	
CR3	2007-000083	R-CHIP;3Kohm,5%,1/10W,TP,1608	1	SA	
DIC2	0801-002701	IC-CMOS LOGIC;74VHCT125A,BUFFER,TSSOP,14	1	SA	
EC5	2402-001059	C-AL,SMD;220UF,20%,6.3V,-,TP,6X6.6X6.6	1	SA	
PC1	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
PC10	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
PC11	2203-000440	C-CER,CHIP;1nF,10%,50V,X7R,TP,1608,-	1	SA	
PC12	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
PC13	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
PC14	2203-000440	C-CER,CHIP;1nF,10%,50V,X7R,TP,1608,-	1	SA	
PC15	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
PC16	2203-000440	C-CER,CHIP;1nF,10%,50V,X7R,TP,1608,-	1	SA	
PC17	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
PC18	2203-001607	C-CER,CHIP;0.22nF,5%,50V,NP0,-,1608	1	SA	
PC19	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
PC2	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
PC20	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
PC3	2203-000851	C-CER,CHIP;0.039NF,5%,50V,C0G,TP,1608	1	SA	
PC4	2203-000851	C-CER,CHIP;0.039NF,5%,50V,C0G,TP,1608	1	SA	
PC5	2203-000440	C-CER,CHIP;1nF,10%,50V,X7R,TP,1608,-	1	SA	
PC6	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
PC7	2203-000440	C-CER,CHIP;1nF,10%,50V,X7R,TP,1608,-	1	SA	
PC8	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
PC9	2203-000440	C-CER,CHIP;1nF,10%,50V,X7R,TP,1608,-	1	SA	
PE1	2402-001059	C-AL,SMD;220UF,20%,6.3V,-,TP,6X6.6X6.6	1	SA	
PE5	2402-000170	C-AL,SMD;1uF,20%,50V,GP,TP,4.3x4.3x5.4,	1	SA	
PIC1	1205-001988	IC-DATA COMM./GEN.;TSB41AB1-PAP,QFP,64P,	1	SA	
PR1	3301-001419	BEAD-SMD;220ohm,1608,500mA,TP,133ohm/70	1	SA	
PR10	2007-000090	R-CHIP;10Kohm,5%,1/10W,TP,1608	1	SA	

Loc.No	Part No	Description ; Specification	Q'ty	S.N.A	Remark
PR12	2007-000078	R-CHIP;1Kohm,5%,1/10W,TP,1608	1	SA	
PR13	2007-000078	R-CHIP;1Kohm,5%,1/10W,TP,1608	1	SA	
PR14	2007-000078	R-CHIP;1Kohm,5%,1/10W,TP,1608	1	SA	
PR15	2007-000078	R-CHIP;1Kohm,5%,1/10W,TP,1608	1	SA	
PR16	2007-000078	R-CHIP;1Kohm,5%,1/10W,TP,1608	1	SA	
PR17	2007-000078	R-CHIP;1Kohm,5%,1/10W,TP,1608	1	SA	
PR18	2007-000965	R-CHIP;5.1Kohm,5%,1/10W,TP,1608	1	SA	
PR19	2007-001044	R-CHIP;56ohm,5%,1/10W,TP,1608	1	SA	
PR2	2007-000078	R-CHIP;1Kohm,5%,1/10W,TP,1608	1	SA	
PR20	2007-001044	R-CHIP;56ohm,5%,1/10W,TP,1608	1	SA	
PR21	2007-001044	R-CHIP;56ohm,5%,1/10W,TP,1608	1	SA	
PR22	2007-001044	R-CHIP;56ohm,5%,1/10W,TP,1608	1	SA	
PR23	2007-001056	R-CHIP;6.2Kohm,5%,1/10W,TP,1608	1	SA	
PR24	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
PR4	2007-000090	R-CHIP;10Kohm,5%,1/10W,TP,1608	1	SA	
PR60	2007-000074	R-CHIP;100ohm,5%,1/10W,TP,1608	1	SA	
PR9	2007-000090	R-CHIP;10Kohm,5%,1/10W,TP,1608	1	SA	
PRA1	2011-000002	R-NET;22OHM,5%,1/16W,L,CHIP,8P,TP,32	1	SA	
PRA2	2011-000002	R-NET;22OHM,5%,1/16W,L,CHIP,8P,TP,32	1	SA	
PY1	2801-004021	CRYSTAL-SMD;24.576MHz,20ppm,28-AAN,12pF,	1	SA	
R10	2007-000084	R-CHIP;4.7Kohm,5%,1/10W,TP,1608	1	SA	
R102	2007-001014	R-CHIP;51OHM,5%,1/10W,TP,1608	1	SA	
R103	2007-001014	R-CHIP;51OHM,5%,1/10W,TP,1608	1	SA	
R11	2007-000084	R-CHIP;4.7Kohm,5%,1/10W,TP,1608	1	SA	
R110	2007-001014	R-CHIP;51OHM,5%,1/10W,TP,1608	1	SA	
R111	2007-001014	R-CHIP;51OHM,5%,1/10W,TP,1608	1	SA	
R112	2007-001014	R-CHIP;51OHM,5%,1/10W,TP,1608	1	SA	
R113	2007-001014	R-CHIP;51OHM,5%,1/10W,TP,1608	1	SA	
R114	2007-000090	R-CHIP;10Kohm,5%,1/10W,TP,1608	1	SA	
R12	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
R13	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
R14	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
R15	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
R16	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
R17	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
R18	2007-000869	R-CHIP;4.7Kohm,1%,1/10W,TP,1608	1	SA	
R19	2007-000763	R-CHIP;330ohm,1%,1/10W,TP,1608	1	SA	
R2	2007-000084	R-CHIP;4.7Kohm,5%,1/10W,TP,1608	1	SA	
R21	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
R22	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
R23	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
R24	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
R25	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
R26	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
R29	2007-000090	R-CHIP;10Kohm,5%,1/10W,TP,1608	1	SA	
R3	2007-000475	R-CHIP;1Mohm,1%,1/10W,TP,1608	1	SA	
R30	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
R32	2007-000074	R-CHIP;100ohm,5%,1/10W,TP,1608	1	SA	
R33	2007-000084	R-CHIP;4.7Kohm,5%,1/10W,TP,1608	1	SA	
R34	2007-000074	R-CHIP;100ohm,5%,1/10W,TP,1608	1	SA	
R35	2007-000074	R-CHIP;100ohm,5%,1/10W,TP,1608	1	SA	
R36	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
R37	2007-000078	R-CHIP;1Kohm,5%,1/10W,TP,1608	1	SA	
R38	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
R39	2007-000077	R-CHIP;470ohm,5%,1/10W,TP,1608	1	SA	

Loc.No	Part No	Description ; Specification	Q'ty	S.N.A	Remark
R40	2007-000086	R-CHIP;5.6Kohm,5%,1/10W,TP,1608	1	SA	
R41	2007-000102	R-CHIP;100Kohm,5%,1/10W,TP,1608	1	SA	
R43	2007-000074	R-CHIP;100ohm,5%,1/10W,TP,1608	1	SA	
R44	2007-000071	R-CHIP;22ohm,5%,1/10W,TP,1608	1	SA	
R45	2007-000071	R-CHIP;22ohm,5%,1/10W,TP,1608	1	SA	
R46	2007-000071	R-CHIP;22ohm,5%,1/10W,TP,1608	1	SA	
R47	2007-000071	R-CHIP;22ohm,5%,1/10W,TP,1608	1	SA	
R48	2007-000071	R-CHIP;22ohm,5%,1/10W,TP,1608	1	SA	
R49	2007-000071	R-CHIP;22ohm,5%,1/10W,TP,1608	1	SA	
R5	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
R50	2007-000071	R-CHIP;22ohm,5%,1/10W,TP,1608	1	SA	
R51	2007-000071	R-CHIP;22ohm,5%,1/10W,TP,1608	1	SA	
R6	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
R7	2007-000084	R-CHIP;4.7Kohm,5%,1/10W,TP,1608	1	SA	
R8	2007-000084	R-CHIP;4.7Kohm,5%,1/10W,TP,1608	1	SA	
R86	2007-000084	R-CHIP;4.7Kohm,5%,1/10W,TP,1608	1	SA	
R87	2007-000078	R-CHIP;1Kohm,5%,1/10W,TP,1608	1	SA	
R88	2007-000078	R-CHIP;1Kohm,5%,1/10W,TP,1608	1	SA	
R89	3301-001309	BEAD-SMD;47OHM,1608,500,TP,-,-,0.3	1	SA	
R9	2007-000084	R-CHIP;4.7Kohm,5%,1/10W,TP,1608	1	SA	
R90	3301-001309	BEAD-SMD;47OHM,1608,500,TP,-,-,0.3	1	SA	
RA1	2011-000515	R-NET;4.7Kohm,5%,1/16W,L,CHIP,8P,TP,	1	SA	
RA2	2011-000515	R-NET;4.7Kohm,5%,1/16W,L,CHIP,8P,TP,	1	SA	
RA3	2011-000515	R-NET;4.7Kohm,5%,1/16W,L,CHIP,8P,TP,	1	SA	
RA4	2011-000515	R-NET;4.7Kohm,5%,1/16W,L,CHIP,8P,TP,	1	SA	
RA5	2011-000881	R-NET;33ohm,5%,1/16W,L,CHIP,8P,TP,3.	1	SA	
RA6	2011-000881	R-NET;33ohm,5%,1/16W,L,CHIP,8P,TP,3.	1	SA	
RA7	2011-000881	R-NET;33ohm,5%,1/16W,L,CHIP,8P,TP,3.	1	SA	
RA8	2011-000881	R-NET;33ohm,5%,1/16W,L,CHIP,8P,TP,3.	1	SA	
RC1	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
RC2	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
RC3	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
RC4	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
RE1	2402-001096	C-AL,SMD;220UF,20%,16V,GP,TP,6.6X6.6X7.	1	SA	
RE2	2402-001059	C-AL,SMD;220UF,20%,6.3V,-,TP,6X6.6X6.6	1	SA	
RE3	2402-001237	C-AL,SMD;330uF,°æ20%,6.3V,-,REEL,6.3X7.	1	SA	
RE4	2402-001237	C-AL,SMD;330uF,°æ20%,6.3V,-,REEL,6.3X7.	1	SA	
RE5	2402-001237	C-AL,SMD;330uF,°æ20%,6.3V,-,REEL,6.3X7.	1	SA	
RIC1A	1203-003698	IC-POSI.FIXED REG.;KIA78D25F,DPAK,3P,6.6	1	SA	
RIC2A	1203-003806	IC-POSI.ADJUST REG.;KIA78R000,DPAK,5P,6.	1	SA	
RP1	2011-000585	R-NET;47OHM,5%,1/16W,L,CHIP,8P,TP	1	SA	
RP10	2011-000585	R-NET;47OHM,5%,1/16W,L,CHIP,8P,TP	1	SA	
RP11	2011-000585	R-NET;47OHM,5%,1/16W,L,CHIP,8P,TP	1	SA	
RP13	2011-000585	R-NET;47OHM,5%,1/16W,L,CHIP,8P,TP	1	SA	
RP14	2011-000585	R-NET;47OHM,5%,1/16W,L,CHIP,8P,TP	1	SA	
RP15	2011-000585	R-NET;47OHM,5%,1/16W,L,CHIP,8P,TP	1	SA	
RP16	2011-000585	R-NET;47OHM,5%,1/16W,L,CHIP,8P,TP	1	SA	
RP17	2011-000585	R-NET;47OHM,5%,1/16W,L,CHIP,8P,TP	1	SA	
RP18	2011-000585	R-NET;47OHM,5%,1/16W,L,CHIP,8P,TP	1	SA	
RP19	2011-000585	R-NET;47OHM,5%,1/16W,L,CHIP,8P,TP	1	SA	
RP2	2011-000585	R-NET;47OHM,5%,1/16W,L,CHIP,8P,TP	1	SA	
RP20	2011-001194	R-NET;51ohm,5%,1/16W,L,CHIP,8P,TP	1	SA	
RP21	2011-001194	R-NET;51ohm,5%,1/16W,L,CHIP,8P,TP	1	SA	
RP22	2011-001194	R-NET;51ohm,5%,1/16W,L,CHIP,8P,TP	1	SA	
RP23	2011-001194	R-NET;51ohm,5%,1/16W,L,CHIP,8P,TP	1	SA	

Loc.No	Part No	Description ; Specification	Q'ty	S.N.A	Remark
RP24	2011-001194	R-NET;51ohm,5%,1/16W,L,CHIP,8P,TP	1	SA	
RP25	2011-001194	R-NET;51ohm,5%,1/16W,L,CHIP,8P,TP	1	SA	
RP26	2011-001194	R-NET;51ohm,5%,1/16W,L,CHIP,8P,TP	1	SA	
RP27	2011-001194	R-NET;51ohm,5%,1/16W,L,CHIP,8P,TP	1	SA	
RP28	2011-001194	R-NET;51ohm,5%,1/16W,L,CHIP,8P,TP	1	SA	
RP29	2011-001194	R-NET;51ohm,5%,1/16W,L,CHIP,8P,TP	1	SA	
RP3	2011-000585	R-NET;47OHM,5%,1/16W,L,CHIP,8P,TP	1	SA	
RP30	2011-001194	R-NET;51ohm,5%,1/16W,L,CHIP,8P,TP	1	SA	
RP31	2011-001194	R-NET;51ohm,5%,1/16W,L,CHIP,8P,TP	1	SA	
RP32	2011-001194	R-NET;51ohm,5%,1/16W,L,CHIP,8P,TP	1	SA	
RP33	2011-001194	R-NET;51ohm,5%,1/16W,L,CHIP,8P,TP	1	SA	
RP34	2011-001194	R-NET;51ohm,5%,1/16W,L,CHIP,8P,TP	1	SA	
RP42	2011-000002	R-NET;22OHM,5%,1/16W,L,CHIP,8P,TP,32	1	SA	
RP43	2011-000002	R-NET;22OHM,5%,1/16W,L,CHIP,8P,TP,32	1	SA	
RP44	2011-000002	R-NET;22OHM,5%,1/16W,L,CHIP,8P,TP,32	1	SA	
RP45	2011-000002	R-NET;22OHM,5%,1/16W,L,CHIP,8P,TP,32	1	SA	
RP5	2011-000585	R-NET;47OHM,5%,1/16W,L,CHIP,8P,TP	1	SA	
RP6	2011-000585	R-NET;47OHM,5%,1/16W,L,CHIP,8P,TP	1	SA	
RP7	2011-000585	R-NET;47OHM,5%,1/16W,L,CHIP,8P,TP	1	SA	
RP8	2011-000585	R-NET;47OHM,5%,1/16W,L,CHIP,8P,TP	1	SA	
RP9	2011-000585	R-NET;47OHM,5%,1/16W,L,CHIP,8P,TP	1	SA	
RR1	3301-001419	BEAD-SMD;220ohm,1608,500mA,TP,133ohm/70	1	SA	
RR3	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
RR4	2007-000078	R-CHIP;1Kohm,5%,1/10W,TP,1608	1	SA	
SE2	2402-001059	C-AL,SMD;220UF,20%,6.3V,-,TP,6X6.6X6.6	1	SA	
SE3	2402-001059	C-AL,SMD;220UF,20%,6.3V,-,TP,6X6.6X6.6	1	SA	
SE4	2402-001059	C-AL,SMD;220UF,20%,6.3V,-,TP,6X6.6X6.6	1	SA	
SE5	2402-001059	C-AL,SMD;220UF,20%,6.3V,-,TP,6X6.6X6.6	1	SA	
SE6	2402-001059	C-AL,SMD;220UF,20%,6.3V,-,TP,6X6.6X6.6	1	SA	
TC1	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
TC10	2402-001237	C-AL,SMD;330uF,°æ20%,6.3V,-,REEL,6.3X7.	1	SA	
TC13	2402-001059	C-AL,SMD;220UF,20%,6.3V,-,TP,6X6.6X6.6	1	SA	
TC16	2203-000626	C-CER,CHIP;0.022nF,5%,50V,C0G,TP,1608	1	SA	
TC17	2203-000626	C-CER,CHIP;0.022nF,5%,50V,C0G,TP,1608	1	SA	
TC18	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
TC19	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
TC2	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
TC20	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
TC21	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
TC22	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
TC23	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
TC24	2203-005065	C-CER,CHIP;1000nF,+80-20%,10V,Y5V,1608	1	SA	
TC25	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
TC26	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
TC27	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
TC3	2203-001567	C-CER,CHIP;0.01nF,0.5pF,50V,NP0,TP,1608	1	SA	
TC34	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
TC51	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
TC52	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
TC7	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
TC8	2402-001237	C-AL,SMD;330uF,°æ20%,6.3V,-,REEL,6.3X7.	1	SA	
TE2	2402-001059	C-AL,SMD;220UF,20%,6.3V,-,TP,6X6.6X6.6	1	SA	
TE5	2402-001059	C-AL,SMD;220UF,20%,6.3V,-,TP,6X6.6X6.6	1	SA	
TIC1	1204-002419	IC-VIDEO DECODER;TW9906,TQFP,80P,12x12mm	1	SA	
TL3	2703-000398	INDUCTOR-SMD;10uH,10%,3225	1	SA	

Loc.No	Part No	Description ; Specification	Q'ty	S.N.A	Remark
TNR50	2011-000475	R-NET;33OHM,5%,1/16W,L,CHIP,8P,TP,32	1	SA	
TNR54	2011-000475	R-NET;33OHM,5%,1/16W,L,CHIP,8P,TP,32	1	SA	
TR10	2007-000080	R-CHIP;2Kohm,5%,1/10W,TP,1608	1	SA	
TR11	2007-000080	R-CHIP;2Kohm,5%,1/10W,TP,1608	1	SA	
TR14	2007-000475	R-CHIP;1Mohm,1%,1/10W,TP,1608	1	SA	
TR16	2007-000113	R-CHIP;33ohm,5%,1/10W,TP,1608	1	SA	
TR17	2007-000113	R-CHIP;33ohm,5%,1/10W,TP,1608	1	SA	
TR21	2007-000113	R-CHIP;33ohm,5%,1/10W,TP,1608	1	SA	
TR22	2007-000113	R-CHIP;33ohm,5%,1/10W,TP,1608	1	SA	
TR34	2007-000074	R-CHIP;100ohm,5%,1/10W,TP,1608	1	SA	
TR40	2007-000113	R-CHIP;33ohm,5%,1/10W,TP,1608	1	SA	
TX1	2801-004095	CRYSTAL-SMD;27MHz,20ppm,28-ABY,14pF,30oh	1	SA	
U1	1205-002704	IC-CODEC;S5L3200,BGA,292P,27x27mm,PLAST	1	SA	
U10	1103-001134	IC-EEPROM;24C040,512x8,SOP,8P,5.13x3.95m	1	SA	
U3	1105-001441	IC-DRAM;HY5DU281622ETP-J,-,128MBit,8Mx	1	SA	
U4	1105-001441	IC-DRAM;HY5DU281622ETP-J,-,128MBit,8Mx	1	SA	
U5	1203-003038	IC-POSI.ADJUST REG.;LP2995,SO,8P,4.9x3.9	1	SA	
U7	0801-002624	IC-CMOS LOGIC;74LVC16374A,16BIT D FLIP-F	1	SA	
U8	0801-002624	IC-CMOS LOGIC;74LVC16374A,16BIT D FLIP-F	1	SA	
U9	1107-001242	IC-FLASH MEMORY;39VF160,1Mx16,TSOP,48P,1	1	SA	
Y1	2801-004095	CRYSTAL-SMD;27MHz,20ppm,28-ABY,14pF,30oh	1	SA	
P022	**AK92-00732A**	**ASSY PCB-MAIN JACK;DVD-VR320A/XAA,K2-2.5**	**1**	**SA**	
AC14	2203-001607	C-CER,CHIP;0.22nF,5%,50V,NP0,-,1608	1	SA	
AC15	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
AC16	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
AC17	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
AC21	2203-000357	C-CER,CHIP;0.15NF,5%,50V,C0G,TP,1608	1	SA	
AC22	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
AC23	2203-000125	C-CER,CHIP;1.2nF,10%,50V,X7R,TP,1608,-	1	SA	
AC24	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
AC25	2203-000357	C-CER,CHIP;0.15NF,5%,50V,C0G,TP,1608	1	SA	
AC26	2203-000125	C-CER,CHIP;1.2nF,10%,50V,X7R,TP,1608,-	1	SA	
AC27	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
AC9	2203-001607	C-CER,CHIP;0.22nF,5%,50V,NP0,-,1608	1	SA	
AD1	0407-000114	DIODE-ARRAY;DAN202K,80V,100mA,CA2-3,SOT-	1	SA	
AD2	0407-000114	DIODE-ARRAY;DAN202K,80V,100mA,CA2-3,SOT-	1	SA	
AD5	0407-000114	DIODE-ARRAY;DAN202K,80V,100mA,CA2-3,SOT-	1	SA	
AE1	2401-000918	C-AL;22uF,20%,16V,GP,-,6.3x7,5	1	SA	
AE11	2401-000918	C-AL;22uF,20%,16V,GP,-,6.3x7,5	1	SA	
AE12	2401-002144	C-AL;47uF,20%,16V,GP,TP,5x11,5	1	SA	
AE13	2401-000909	C-AL;22uF,20%,16V,GP,TP,5x5,2.5	1	SA	
AE14	2401-002144	C-AL;47uF,20%,16V,GP,TP,5x11,5	1	SA	
AE5	2401-000918	C-AL;22uF,20%,16V,GP,-,6.3x7,5	1	SA	
AE6	2401-000909	C-AL;22uF,20%,16V,GP,TP,5x5,2.5	1	SA	
AE7	2401-000909	C-AL;22uF,20%,16V,GP,TP,5x5,2.5	1	SA	
AIC4	1201-000163	IC-OP AMP;4560,SOP,8P,173MIL,DUAL,100V/m	1	SA	
AIC5	1201-000163	IC-OP AMP;4560,SOP,8P,173MIL,DUAL,100V/m	1	SA	
AQ1	0504-000128	TR-DIGITAL;-,NPN,200MW,22K/22K,SOT-23,TP	1	SA	
AQ2	0504-000156	TR-DIGITAL;KSR2103,PNP,200MW,22K/22K,SOT	1	SA	
AQ3	0501-000341	TR-SMALL SIGNAL;KSC1623-L,NPN,200mW,SOT-	1	SA	
AQ4	0504-000128	TR-DIGITAL;-,NPN,200MW,22K/22K,SOT-23,TP	1	SA	
AQ5	0504-000156	TR-DIGITAL;KSR2103,PNP,200MW,22K/22K,SOT	1	SA	
AQ6	0501-000341	TR-SMALL SIGNAL;KSC1623-L,NPN,200mW,SOT-	1	SA	

Loc.No	Part No	Description ; Specification	Q'ty	S.N.A	Remark
AR17	2001-000429	R-CARBON;1KOHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
AR18	2001-000515	R-CARBON;220OHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
AR22	2007-000090	R-CHIP;10Kohm,5%,1/10W,TP,1608	1	SA	
AR23	2001-000515	R-CARBON;220OHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
AR24	2007-000075	R-CHIP;220ohm,5%,1/10W,TP,1608	1	SA	
AR28	2007-000090	R-CHIP;10Kohm,5%,1/10W,TP,1608	1	SA	
AR29	2007-000075	R-CHIP;220ohm,5%,1/10W,TP,1608	1	SA	
AR30	2007-000075	R-CHIP;220ohm,5%,1/10W,TP,1608	1	SA	
AR31	2001-000429	R-CARBON;1KOHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
AR32	2001-000515	R-CARBON;220OHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
AR33	2007-000102	R-CHIP;100Kohm,5%,1/10W,TP,1608	1	SA	
AR34	2007-000102	R-CHIP;100Kohm,5%,1/10W,TP,1608	1	SA	
AR35	2007-000102	R-CHIP;100Kohm,5%,1/10W,TP,1608	1	SA	
AR36	2007-000074	R-CHIP;100ohm,5%,1/10W,TP,1608	1	SA	
AR37	2007-000102	R-CHIP;100Kohm,5%,1/10W,TP,1608	1	SA	
AR38	2007-000102	R-CHIP;100Kohm,5%,1/10W,TP,1608	1	SA	
AR39	2007-000102	R-CHIP;100Kohm,5%,1/10W,TP,1608	1	SA	
AR40	2001-000281	R-CARBON;100OHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
AR41	2007-000090	R-CHIP;10Kohm,5%,1/10W,TP,1608	1	SA	
AR42	2007-000091	R-CHIP;12Kohm,5%,1/10W,TP,1608	1	SA	
AR43	2007-000092	R-CHIP;15Kohm,5%,1/10W,TP,1608	1	SA	
AR44	2007-000102	R-CHIP;100Kohm,5%,1/10W,TP,1608	1	SA	
AR45	2007-000102	R-CHIP;100Kohm,5%,1/10W,TP,1608	1	SA	
AR46	2001-000290	R-CARBON;10KOHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
AR47	2007-000091	R-CHIP;12Kohm,5%,1/10W,TP,1608	1	SA	
AR48	2007-000092	R-CHIP;15Kohm,5%,1/10W,TP,1608	1	SA	
AR49	2007-000102	R-CHIP;100Kohm,5%,1/10W,TP,1608	1	SA	
AR50	2007-000102	R-CHIP;100Kohm,5%,1/10W,TP,1608	1	SA	
C401	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C402	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C403	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C404	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C405	2203-005249	C-CER,CHIP;100nF,10%,50V,X7R,TP,1608,-	1	SA	
C4M01	2401-000588	C-AL;1uF,20%,50V,GP,TP,3x5,2.5	1	SA	
C4M02	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C4M03	2401-000588	C-AL;1uF,20%,50V,GP,TP,3x5,2.5	1	SA	
C4M04	2401-000588	C-AL;1uF,20%,50V,GP,TP,3x5,2.5	1	SA	
C4M05	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C4M06	2203-000491	C-CER,CHIP;2.2nF,10%,50V,X7R,TP,1608,-	1	SA	
C4M07	2401-000588	C-AL;1uF,20%,50V,GP,TP,3x5,2.5	1	SA	
C4M08	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C4M09	2401-000909	C-AL;22uF,20%,16V,GP,TP,5x5,2.5	1	SA	
C4M10	2401-001249	C-AL;4.7uF,20%,35V,GP,TP,4x5,2.5	1	SA	
C4M11	2401-001249	C-AL;4.7uF,20%,35V,GP,TP,4x5,2.5	1	SA	
C4M12	2401-000918	C-AL;22uF,20%,16V,GP,-,6.3x7,5	1	SA	
C4M13	2401-001250	C-AL;4.7uF,20%,35V,GP,TP,4x5,5	1	SA	
C4M14	2401-001250	C-AL;4.7uF,20%,35V,GP,TP,4x5,5	1	SA	
C4M15	2203-000669	C-CER,CHIP;27nF,10%,25V,X7R,TP,1608,-	1	SA	
C4M16	2401-000598	C-AL;1uF,20%,50V,GP,TP,4x7,5	1	SA	
C4M17	2401-000414	C-AL;10uF,20%,16V,GP,TP,4x7,5	1	SA	
C4M18	2401-000414	C-AL;10uF,20%,16V,GP,TP,4x7,5	1	SA	
C4M19	2401-000414	C-AL;10uF,20%,16V,GP,TP,4x7,5	1	SA	
C4M20	2401-001919	C-AL;2.2uF,20%,50V,-,TP,4x7mm,5	1	SA	
C4M21	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C4M22	2401-001919	C-AL;2.2uF,20%,50V,-,TP,4x7mm,5	1	SA	
C4M23	2203-002398	C-CER,CHIP;22nF,10%,50V,X7R,1608	1	SA	
C4M24	2401-000598	C-AL;1uF,20%,50V,GP,TP,4x7,5	1	SA	
C4M25	2401-002165	C-AL;100uF,20%,16V,GP,TP,6.3x7,5	1	SA	
C800	2401-000414	C-AL;10uF,20%,16V,GP,TP,4x7,5	1	SA	
C801	2401-001479	C-AL;470uF,20%,10V,GP,TP,6.3*11mm,5	1	SA	
C802	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C803	2401-002144	C-AL;47uF,20%,16V,GP,TP,5x11,5	1	SA	
C804	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C805	2401-000414	C-AL;10uF,20%,16V,GP,TP,4x7,5	1	SA	
C806	2401-000414	C-AL;10uF,20%,16V,GP,TP,4x7,5	1	SA	
C807	2401-000414	C-AL;10uF,20%,16V,GP,TP,4x7,5	1	SA	
C808	2401-000414	C-AL;10uF,20%,16V,GP,TP,4x7,5	1	SA	
C809	2401-000414	C-AL;10uF,20%,16V,GP,TP,4x7,5	1	SA	
C811	2401-000414	C-AL;10uF,20%,16V,GP,TP,4x7,5	1	SA	
C813	2401-000414	C-AL;10uF,20%,16V,GP,TP,4x7,5	1	SA	
C814	2401-000414	C-AL;10uF,20%,16V,GP,TP,4x7,5	1	SA	
C817	2401-000414	C-AL;10uF,20%,16V,GP,TP,4x7,5	1	SA	
C819	2401-000414	C-AL;10uF,20%,16V,GP,TP,4x7,5	1	SA	
C820	2401-000414	C-AL;10uF,20%,16V,GP,TP,4x7,5	1	SA	
C821	2401-000414	C-AL;10uF,20%,16V,GP,TP,4x7,5	1	SA	
C824	2401-000414	C-AL;10uF,20%,16V,GP,TP,4x7,5	1	SA	
C825	2401-000414	C-AL;10uF,20%,16V,GP,TP,4x7,5	1	SA	
C826	2401-000414	C-AL;10uF,20%,16V,GP,TP,4x7,5	1	SA	
C827	2401-000414	C-AL;10uF,20%,16V,GP,TP,4x7,5	1	SA	
C828	2401-002144	C-AL;47uF,20%,16V,GP,TP,5x11,5	1	SA	
C829	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C830	2401-001479	C-AL;470uF,20%,10V,GP,TP,6.3*11mm,5	1	SA	
C832	2401-002144	C-AL;47uF,20%,16V,GP,TP,5x11,5	1	SA	
C833	2203-000998	C-CER,CHIP;0.047NF,5%,50V,C0G,TP,1608	1	SA	
C834	2203-000236	C-CER,CHIP;0.1NF,5%,50V,C0G,TP,1608	1	SA	
C835	2401-001250	C-AL;4.7uF,20%,35V,GP,TP,4x5,5	1	SA	
C836	2401-000414	C-AL;10uF,20%,16V,GP,TP,4x7,5	1	SA	
C837	2401-000414	C-AL;10uF,20%,16V,GP,TP,4x7,5	1	SA	
C838	2401-000414	C-AL;10uF,20%,16V,GP,TP,4x7,5	1	SA	
C839	2401-000414	C-AL;10uF,20%,16V,GP,TP,4x7,5	1	SA	
C840	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C841	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
C842	2401-000414	C-AL;10uF,20%,16V,GP,TP,4x7,5	1	SA	
C843	2203-000783	C-CER,CHIP;0.33NF,5%,50V,C0G,TP,1608	1	SA	
C844	2203-000783	C-CER,CHIP;0.33NF,5%,50V,C0G,TP,1608	1	SA	
C845	2203-000783	C-CER,CHIP;0.33NF,5%,50V,C0G,TP,1608	1	SA	
C846	2203-000783	C-CER,CHIP;0.33NF,5%,50V,C0G,TP,1608	1	SA	
C847	2401-000414	C-AL;10uF,20%,16V,GP,TP,4x7,5	1	SA	
C848	2401-000414	C-AL;10uF,20%,16V,GP,TP,4x7,5	1	SA	
CE401	2401-001479	C-AL;470uF,20%,10V,GP,TP,6.3*11mm,5	1	SA	
CE76	2401-003480	C-AL;1000UF,20%,10V,LZ,TP,10X16MM,5	1	SA	
CN7	3722-002118	JACK-IEEE1394;4P,NI,BLK,ANGLE,IEEE1394	1	SA	
CNR20	2007-000084	R-CHIP;4.7Kohm,5%,1/10W,TP,1608	1	SA	
CS01	2203-000257	C-CER,CHIP;10nF,10%,50V,X7R,TP,1608	1	SA	
CS02	2401-001492	C-AL;47uF,20%,16V,GP,-,5x7mm,2.5	1	SA	
CS04	2401-000408	C-AL;10uF,20%,16V,GP,TP,3.5x5,2.5	1	SA	
CVL1	3301-001419	BEAD-SMD;220ohm,1608,500mA,TP,133ohm/70	1	SA	
CVL2	3301-001419	BEAD-SMD;220ohm,1608,500mA,TP,133ohm/70	1	SA	
CVL3	3301-001419	BEAD-SMD;220ohm,1608,500mA,TP,133ohm/70	1	SA	
DOC3	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	

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Loc.No	Part No	Description ; Specification	Q'ty	S.N.A	Remark
DOC4	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
DOE1	2401-000598	C-AL;1uF,20%,50V,GP,TP,4x7,5	1	SA	
DOIC2	3707-001070	CONNECTOR-OPTICAL;PLUG,GP1FA550TZ,6dB,2.	1	SA	
DOL1	2901-001273	FILTER-EMI SMD;50V,2A,-,220pF,3.2x1.6x0.	1	SA	
DOL2	3301-001419	BEAD-SMD;220ohm,1608,500mA,TP,133ohm/70	1	SA	
DOL3	2701-000002	INDUCTOR-AXIAL;100UH,10%,4298	1	SA	
DOL4	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
DOR1	2007-000040	R-CHIP;150ohm,1%,1/10W,TP,1608	1	SA	
DOR2	2007-000074	R-CHIP;100ohm,5%,1/10W,TP,1608	1	SA	
DOR3	2007-000075	R-CHIP;220ohm,5%,1/10W,TP,1608	1	SA	
DVR1	3301-000314	BEAD-SMD;120ohm,1.6x0.8x0.8mm,150mA,,,,	1	SA	
DVR2	3301-000314	BEAD-SMD;120ohm,1.6x0.8x0.8mm,150mA,,,,	1	SA	
DVR3	3301-000314	BEAD-SMD;120ohm,1.6x0.8x0.8mm,150mA,,,,	1	SA	
DVR4	3301-000314	BEAD-SMD;120ohm,1.6x0.8x0.8mm,150mA,,,,	1	SA	
FVR1	3301-001419	BEAD-SMD;220ohm,1608,500mA,TP,133ohm/70	1	SA	
FVR2	3301-001419	BEAD-SMD;220ohm,1608,500mA,TP,133ohm/70	1	SA	
FVR3	3301-001419	BEAD-SMD;220ohm,1608,500mA,TP,133ohm/70	1	SA	
FVR4	3301-001419	BEAD-SMD;220ohm,1608,500mA,TP,133ohm/70	1	SA	
FVR5	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
FVR6	2007-000078	R-CHIP;1Kohm,5%,1/10W,TP,1608	1	SA	
FVR7	2007-000078	R-CHIP;1Kohm,5%,1/10W,TP,1608	1	SA	
IC4M01	1204-002337	IC-DECODER;LA72700V,SSOP,36P,275MIL,PLAS	1	SA	
JACK1	3722-002302	JACK-PIN;6P,Ni,WH-GN/RD-BU/BK-RD,ANGLE	1	SA	
JK701	3722-001943	JACK-PIN;3P,8.3PI,NI,BLK,-	1	SA	
JK801	3722-002301	JACK-PIN;6P,Ni,YL/WH/RDx2,ANGLE	1	SA	
JL1	3301-001419	BEAD-SMD;220ohm,1608,500mA,TP,133ohm/70	1	SA	
JL2	3301-001419	BEAD-SMD;220ohm,1608,500mA,TP,133ohm/70	1	SA	
L4M01	2701-000002	INDUCTOR-AXIAL;100UH,10%,4298	1	SA	
L801	2701-000002	INDUCTOR-AXIAL;100UH,10%,4298	1	SA	
L802	2701-000002	INDUCTOR-AXIAL;100UH,10%,4298	1	SA	
LS01	2701-000002	INDUCTOR-AXIAL;100UH,10%,4298	1	SA	
MCON1	3708-000270	CONNECTOR-FPC/FFC/PIC;33P,1.25MM,STRAIGH	1	SA	
MCON2	3708-000270	CONNECTOR-FPC/FFC/PIC;33P,1.25MM,STRAIGH	1	SA	
P022	3711-005612	CONNECTOR-HEADER;BOX,30P,2R,2mm,STRAIGHT	1	SA	
P022	3711-005612	CONNECTOR-HEADER;BOX,30P,2R,2mm,STRAIGHT	1	SA	
P022	AC37-00027A	CONNECTOR-HEADER;20045WS,X-11,T8.5,W17.4	1	SA	
PC21	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
PC22	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
PC23	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
PC25	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
PE10	2401-002165	C-AL;100uF,20%,16V,GP,TP,6.3x7,5	1	SA	
PE11	2401-002165	C-AL;100uF,20%,16V,GP,TP,6.3x7,5	1	SA	
PE12	2401-003221	C-AL;100uF,20%,16V,GP,TP,8X5,2.5	1	SA	
PE13	2401-003221	C-AL;100uF,20%,16V,GP,TP,8X5,2.5	1	SA	
PE14	2401-003221	C-AL;100uF,20%,16V,GP,TP,8X5,2.5	1	SA	
PE7	2401-002165	C-AL;100uF,20%,16V,GP,TP,6.3x7,5	1	SA	
PE8	2401-001543	C-AL;47uF,20%,25V,GP,TP,6.3x5mm,2.5	1	SA	
PE9	2401-002165	C-AL;100uF,20%,16V,GP,TP,6.3x7,5	1	SA	
PL5	2701-000002	INDUCTOR-AXIAL;100UH,10%,4298	1	SA	
PL6	2701-000002	INDUCTOR-AXIAL;100UH,10%,4298	1	SA	
Q801	0501-000002	TR-SMALL SIGNAL;KSA812,PNP,150MW,SOT-23,	1	SA	
QS01	0501-000002	TR-SMALL SIGNAL;KSA812,PNP,150MW,SOT-23,	1	SA	
QS02	0501-000341	TR-SMALL SIGNAL;KSC1623-L,NPN,200mW,SOT-	1	SA	
QS03	0501-000341	TR-SMALL SIGNAL;KSC1623-L,NPN,200mW,SOT-	1	SA	
R401	2007-000450	R-CHIP;180ohm,5%,1/10W,TP,1608	1	SA	
R402	2007-000450	R-CHIP;180ohm,5%,1/10W,TP,1608	1	SA	
R4M02	2007-000084	R-CHIP;4.7Kohm,5%,1/10W,TP,1608	1	SA	
R4M04	2007-000090	R-CHIP;10Kohm,5%,1/10W,TP,1608	1	SA	
R4M05	2007-000090	R-CHIP;10Kohm,5%,1/10W,TP,1608	1	SA	
R801	2001-000429	R-CARBON;1KOHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
R802	2007-000078	R-CHIP;1Kohm,5%,1/10W,TP,1608	1	SA	
R803	2001-000036	R-CARBON;330OHM,5%,1/4W,AA,TP,2.4X6.4MM	1	SA	
R804	2007-000073	R-CHIP;91ohm,5%,1/10W,TP,1608	1	SA	
R805	2007-000078	R-CHIP;1Kohm,5%,1/10W,TP,1608	1	SA	
R806	2007-000078	R-CHIP;1Kohm,5%,1/10W,TP,1608	1	SA	
R807	2001-000281	R-CARBON;100OHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
R808	2001-000281	R-CARBON;100OHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
R809	2007-000078	R-CHIP;1Kohm,5%,1/10W,TP,1608	1	SA	
R810	2001-000449	R-CARBON;2.2KOHM,5%,1/8W,AA,TP,1.8X3.2M	1	SA	
R811	2001-000281	R-CARBON;100OHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
R812	2001-000449	R-CARBON;2.2KOHM,5%,1/8W,AA,TP,1.8X3.2M	1	SA	
R813	2007-000097	R-CHIP;47Kohm,5%,1/10W,TP,1608	1	SA	
R814	2007-000097	R-CHIP;47Kohm,5%,1/10W,TP,1608	1	SA	
R815	2001-000281	R-CARBON;100OHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
R817	2001-000405	R-CARBON;180OHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
R818	2001-000405	R-CARBON;180OHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
R819	3301-001419	BEAD-SMD;220ohm,1608,500mA,TP,133ohm/70	1	SA	
R820	3301-001419	BEAD-SMD;220ohm,1608,500mA,TP,133ohm/70	1	SA	
R821	2007-000134	R-CHIP;33Kohm,5%,1/10W,TP,1608	1	SA	
R822	2007-000134	R-CHIP;33Kohm,5%,1/10W,TP,1608	1	SA	
R823	3301-001419	BEAD-SMD;220ohm,1608,500mA,TP,133ohm/70	1	SA	
R851	3301-001419	BEAD-SMD;220ohm,1608,500mA,TP,133ohm/70	1	SA	
R852	3301-001419	BEAD-SMD;220ohm,1608,500mA,TP,133ohm/70	1	SA	
R853	2007-001167	R-CHIP;75ohm,5%,1/10W,TP,1608	1	SA	
R854	2007-000134	R-CHIP;33Kohm,5%,1/10W,TP,1608	1	SA	
R855	2007-000134	R-CHIP;33Kohm,5%,1/10W,TP,1608	1	SA	
R856	2007-001167	R-CHIP;75ohm,5%,1/10W,TP,1608	1	SA	
RS01	2007-001167	R-CHIP;75ohm,5%,1/10W,TP,1608	1	SA	
RS02	2007-000125	R-CHIP;3.9Kohm,5%,1/10W,TP,1608	1	SA	
RS03	2007-000094	R-CHIP;22Kohm,5%,1/10W,TP,1608	1	SA	
RS04	2007-000078	R-CHIP;1Kohm,5%,1/10W,TP,1608	1	SA	
RS05	2007-000078	R-CHIP;1Kohm,5%,1/10W,TP,1608	1	SA	
RS06	2007-001167	R-CHIP;75ohm,5%,1/10W,TP,1608	1	SA	
RS07	2007-000097	R-CHIP;47Kohm,5%,1/10W,TP,1608	1	SA	
RS08	2007-000097	R-CHIP;47Kohm,5%,1/10W,TP,1608	1	SA	
RS09	2007-000125	R-CHIP;3.9Kohm,5%,1/10W,TP,1608	1	SA	
RS10	2007-000077	R-CHIP;470ohm,5%,1/10W,TP,1608	1	SA	
SJACK	3722-001924	JACK-DIN;4P/2C,-,SN,BLK,-	1	SA	
SVL1	3301-001419	BEAD-SMD;220ohm,1608,500mA,TP,133ohm/70	1	SA	
SVL2	3301-001419	BEAD-SMD;220ohm,1608,500mA,TP,133ohm/70	1	SA	
SW713	3404-001182	SWITCH-TACT;DC12V,50MA,100GF,6.0X6.0X5.0	1	SA	
SW714	3404-001182	SWITCH-TACT;DC12V,50MA,100GF,6.0X6.0X5.0	1	SA	
SW715	3404-001182	SWITCH-TACT;DC12V,50MA,100GF,6.0X6.0X5.0	1	SA	
TM401	AK40-00024A	TM BLOCK;VQA05ASE,NTSC,181CH,-,25dB,5V,	1	SA	
VC10	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
VC11	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
VC17	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
VC6	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
VC7	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
VC8	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	

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VC9	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
VDR1	2007-001164	R-CHIP;75ohm,1%,1/10W,TP,1608	1	SA	
VDR2	2007-001164	R-CHIP;75ohm,1%,1/10W,TP,1608	1	SA	
VDR4	2007-001164	R-CHIP;75ohm,1%,1/10W,TP,1608	1	SA	
VDR5	2007-001164	R-CHIP;75ohm,1%,1/10W,TP,1608	1	SA	
VDR6	2007-001164	R-CHIP;75ohm,1%,1/10W,TP,1608	1	SA	
VE1	2401-002165	C-AL;100uF,20%,16V,GP,TP,6.3x7,5	1	SA	
VE2	2401-000909	C-AL;22uF,20%,16V,GP,TP,5x5,2.5	1	SA	
VE4	2401-001479	C-AL;470uF,20%,10V,GP,TP,6.3*11mm,5	1	SA	
VE5	2401-001479	C-AL;470uF,20%,10V,GP,TP,6.3*11mm,5	1	SA	
VE6	2401-001479	C-AL;470uF,20%,10V,GP,TP,6.3*11mm,5	1	SA	
VE7	2401-001479	C-AL;470uF,20%,10V,GP,TP,6.3*11mm,5	1	SA	
VIC1	1204-001978	IC-VIDEO PROCESS;LA73054,-,36P,-,SSOP,7V	1	SA	
VL6	2701-000002	INDUCTOR-AXIAL;100UH,10%,4298	1	SA	
VR30	2007-001167	R-CHIP;75ohm,5%,1/10W,TP,1608	1	SA	
VR31	2007-001167	R-CHIP;75ohm,5%,1/10W,TP,1608	1	SA	
VR32	2007-001167	R-CHIP;75ohm,5%,1/10W,TP,1608	1	SA	
VR33	2007-001167	R-CHIP;75ohm,5%,1/10W,TP,1608	1	SA	
VR34	2001-000969	R-CARBON;75OHM,5%,1/8W,AA,TP,1.8X3.2MM	1	SA	
ZD801	0403-001083	DIODE-ZENER;UDZ9.1B,8.85-9.23V,200MW,UMD	1	SA	
ZD802	0403-001083	DIODE-ZENER;UDZ9.1B,8.85-9.23V,200MW,UMD	1	SA	
ZD803	0403-001083	DIODE-ZENER;UDZ9.1B,8.85-9.23V,200MW,UMD	1	SA	
ZD804	0403-001083	DIODE-ZENER;UDZ9.1B,8.85-9.23V,200MW,UMD	1	SA	
ZD805	0403-001083	DIODE-ZENER;UDZ9.1B,8.85-9.23V,200MW,UMD	1	SA	
ZD806	0403-001083	DIODE-ZENER;UDZ9.1B,8.85-9.23V,200MW,UMD	1	SA	
ZD807	0403-001083	DIODE-ZENER;UDZ9.1B,8.85-9.23V,200MW,UMD	1	SA	
ZD808	0403-001083	DIODE-ZENER;UDZ9.1B,8.85-9.23V,200MW,UMD	1	SA	
H001	**AK97-01211A**	**ASSY-ASSY LOADER DRIVE;-,SV-R250,ASSY LO**	**1**	**SA**	
	6003-001478	SCREW-TAPTITE;PH,+,B,M2.6,L8,ZPC(YEL)	2	SNA	
	AK92-00595A	ASSY PCB-FRONT END;SV-R250,FRONT-END PCB	1	SNA	
	AC99-40098E	ASSY PCB-FRONT END,c;SV-R250,FRONT-END P	1	SNA	
-	AD02-13001H	SOLDER-CREAM;RX3603-2330,-,-,60SN/3BI/37	4.04	SNA	
	AK41-00352A	**PCB MAIN-F/END;SV-R2500,EPOXY,4,-,T1.2,1**	**0.5**	**SNA**	
AR1	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
AR2	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
AR3	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
CC1	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
CC2	2203-000440	C-CER,CHIP;1nF,10%,50V,X7R,TP,1608,-	1	SA	
CC3	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
CIC1	1203-003177	IC-VOL. DETECTOR;BD5326G,SSOP,5P,2.9x1.6	1	SA	
CON1	3708-002092	CONNECTOR-FPC/FFC/PIC;54P,0.5mm,SMD-A,SN	1	SA	
CON2	3708-002018	CONNECTOR-FPC/FFC/PIC;4P,1MM,SMD-A,SN,NO	1	SA	
CON3	3708-001878	CONNECTOR-FPC/FFC/PIC;6P,1MM,SMD-A,SNPB,	1	SA	
CON4	3708-002067	CONNECTOR-FPC/FFC/PIC;12P,1mm,SMD-A,SN,N	1	SA	
CR1	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
CR13	2007-000090	R-CHIP;10Kohm,5%,1/10W,TP,1608	1	SA	
CR2	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
CR3	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
CR4	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
CR5	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
CR6	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
CR7	2007-000078	R-CHIP;1Kohm,5%,1/10W,TP,1608	1	SA	
JP9	3708-001331	CONNECTOR-FPC/FFC/PIC;40P,0.5MM,SMD-A,SN	1	SA	

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PC12	2402-001042	C-AL,SMD;100uF,20%,16V,GP,TP,6.6x6.6x5.	1	SA	
PC13	2404-000256	C-TA,CHIP;47UF,20%,16V,GP,TP,7343	1	SA	
PC14	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
PC15	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
PC16	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
PC17	2402-001042	C-AL,SMD;100uF,20%,16V,GP,TP,6.6x6.6x5.	1	SA	
PC18	2402-001042	C-AL,SMD;100uF,20%,16V,GP,TP,6.6x6.6x5.	1	SA	
PC19	2402-001042	C-AL,SMD;100uF,20%,16V,GP,TP,6.6x6.6x5.	1	SA	
PC20	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
PC21	2402-001042	C-AL,SMD;100uF,20%,16V,GP,TP,6.6x6.6x5.	1	SA	
PC22	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
PC8	2402-001042	C-AL,SMD;100uF,20%,16V,GP,TP,6.6x6.6x5.	1	SA	
PC9	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
PCN	3711-005477	CONNECTOR-HEADER;BOX,4P,1R,2mm,SMD-A,Sn+	1	SA	
PIC1	1203-003175	IC-MULTI REG.;BA33C25HFP,HRP,5P,9.39X8MM	1	SA	
PIC2	1203-003176	IC-MULTI REG.;BA33C18HFP,HRP,5P,9.39X8MM	1	SA	
PL1	2901-001281	FILTER-EMI SMD;16V,2A,-,220000pF,2.00x1.	1	SA	
PL2	2901-001281	FILTER-EMI SMD;16V,2A,-,220000pF,2.00x1.	1	SA	
PL3	2901-001281	FILTER-EMI SMD;16V,2A,-,220000pF,2.00x1.	1	SA	
PL4	2901-001281	FILTER-EMI SMD;16V,2A,-,220000pF,2.00x1.	1	SA	
PL5	2901-001281	FILTER-EMI SMD;16V,2A,-,220000pF,2.00x1.	1	SA	
R118	2007-000113	R-CHIP;33ohm,5%,1/10W,TP,1608	1	SA	
R119	2007-000113	R-CHIP;33ohm,5%,1/10W,TP,1608	1	SA	
R51	2007-000090	R-CHIP;10Kohm,5%,1/10W,TP,1608	1	SA	
RC1	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
RC10	2203-000257	C-CER,CHIP;10nF,10%,50V,X7R,TP,1608	1	SA	
RC11	2203-000257	C-CER,CHIP;10nF,10%,50V,X7R,TP,1608	1	SA	
RC12	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
RC13	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
RC14	2404-000284	C-TA,CHIP;10uF,20%,16V,-,TP,3528	1	SA	
RC15	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
RC16	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
RC17	2203-000236	C-CER,CHIP;0.1NF,5%,50V,C0G,TP,1608	1	SA	
RC18	2203-000257	C-CER,CHIP;10nF,10%,50V,X7R,TP,1608	1	SA	
RC19	2203-000236	C-CER,CHIP;0.1NF,5%,50V,C0G,TP,1608	1	SA	
RC2	2404-000284	C-TA,CHIP;10uF,20%,16V,-,TP,3528	1	SA	
RC20	2203-000257	C-CER,CHIP;10nF,10%,50V,X7R,TP,1608	1	SA	
RC21	2203-001697	C-CER,CHIP;0.082nF,5%,50V,NP0,1608	1	SA	
RC22	2203-000257	C-CER,CHIP;10nF,10%,50V,X7R,TP,1608	1	SA	
RC23	2203-001697	C-CER,CHIP;0.082nF,5%,50V,NP0,1608	1	SA	
RC24	2203-000257	C-CER,CHIP;10nF,10%,50V,X7R,TP,1608	1	SA	
RC25	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
RC26	2203-000257	C-CER,CHIP;10nF,10%,50V,X7R,TP,1608	1	SA	
RC27	2203-000236	C-CER,CHIP;0.1NF,5%,50V,C0G,TP,1608	1	SA	
RC28	2203-000257	C-CER,CHIP;10nF,10%,50V,X7R,TP,1608	1	SA	
RC29	2203-000236	C-CER,CHIP;0.1NF,5%,50V,C0G,TP,1608	1	SA	
RC3	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
RC30	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
RC31	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
RC32	2203-000236	C-CER,CHIP;0.1NF,5%,50V,C0G,TP,1608	1	SA	
RC33	2404-000284	C-TA,CHIP;10uF,20%,16V,-,TP,3528	1	SA	
RC34	2404-000284	C-TA,CHIP;10uF,20%,16V,-,TP,3528	1	SA	
RC35	2404-000284	C-TA,CHIP;10uF,20%,16V,-,TP,3528	1	SA	
RC36	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
RC37	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	

Loc.No	Part No	Description ; Specification	Q'ty	S.N.A	Remark
RC38	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
RC39	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
RC4	2203-000257	C-CER,CHIP;10nF,10%,50V,X7R,TP,1608	1	SA	
RC40	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
RC41	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
RC42	2203-000257	C-CER,CHIP;10nF,10%,50V,X7R,TP,1608	1	SA	
RC43	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
RC44	2203-000257	C-CER,CHIP;10nF,10%,50V,X7R,TP,1608	1	SA	
RC45	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
RC46	2203-000440	C-CER,CHIP;1nF,10%,50V,X7R,TP,1608,-	1	SA	
RC47	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
RC48	2203-000257	C-CER,CHIP;10nF,10%,50V,X7R,TP,1608	1	SA	
RC5	2203-000257	C-CER,CHIP;10nF,10%,50V,X7R,TP,1608	1	SA	
RC50	2404-000284	C-TA,CHIP;10uF,20%,16V,-,TP,3528	1	SA	
RC51	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
RC52	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
RC53	2203-000560	C-CER,CHIP;220nF,+80-20%,25V,Y5V,TP,1608	1	SA	
RC54	2203-000257	C-CER,CHIP;10nF,10%,50V,X7R,TP,1608	1	SA	
RC55	2203-000257	C-CER,CHIP;10nF,10%,50V,X7R,TP,1608	1	SA	
RC56	2203-000257	C-CER,CHIP;10nF,10%,50V,X7R,TP,1608	1	SA	
RC57	2203-000560	C-CER,CHIP;220nF,+80-20%,25V,Y5V,TP,1608	1	SA	
RC58	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
RC59	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
RC6	2203-000440	C-CER,CHIP;1nF,10%,50V,X7R,TP,1608,-	1	SA	
RC60	2404-000284	C-TA,CHIP;10uF,20%,16V,-,TP,3528	1	SA	
RC61	2203-000257	C-CER,CHIP;10nF,10%,50V,X7R,TP,1608	1	SA	
RC62	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
RC63	2203-000236	C-CER,CHIP;0.1NF,5%,50V,C0G,TP,1608	1	SA	
RC64	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
RC65	2203-000236	C-CER,CHIP;0.1NF,5%,50V,C0G,TP,1608	1	SA	
RC67	2203-000236	C-CER,CHIP;0.1NF,5%,50V,C0G,TP,1608	1	SA	
RC7	2203-000440	C-CER,CHIP;1nF,10%,50V,X7R,TP,1608,-	1	SA	
RC74	2203-000626	C-CER,CHIP;0.022nF,5%,50V,C0G,TP,1608	1	SA	
RC75	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
RC8	2203-000626	C-CER,CHIP;0.022nF,5%,50V,C0G,TP,1608	1	SA	
RC9	2203-000257	C-CER,CHIP;10nF,10%,50V,X7R,TP,1608	1	SA	
RD32	2404-000284	C-TA,CHIP;10uF,20%,16V,-,TP,3528	1	SA	
RIC1	1001-001183	IC-ANALOG SWITCH;MAX4684EUB,-,TSSOP,10P,	1	SNA	
RIC2	AK13-00018A	IC ASIC;S1L1491X,-,128 PIN,7V,-0 ~ +70	1	SNA	
RR1	2007-000090	R-CHIP;10Kohm,5%,1/10W,TP,1608	1	SA	
RR10	2007-001161	R-CHIP;75Kohm,5%,1/10W,TP,1608	1	SA	
RR11	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
RR12	2007-000090	R-CHIP;10Kohm,5%,1/10W,TP,1608	1	SA	
RR13	2007-000090	R-CHIP;10Kohm,5%,1/10W,TP,1608	1	SA	
RR14	2007-000090	R-CHIP;10Kohm,5%,1/10W,TP,1608	1	SA	
RR15	2007-000591	R-CHIP;22ohm,1%,1/10W,TP,1608	1	SA	
RR16	2007-000591	R-CHIP;22ohm,1%,1/10W,TP,1608	1	SA	
RR17	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
RR18	2007-000090	R-CHIP;10Kohm,5%,1/10W,TP,1608	1	SA	
RR19	2007-000065	R-CHIP;2.2Mohm,5%,1/10W,TP,1608	1	SA	
RR2	2007-000090	R-CHIP;10Kohm,5%,1/10W,TP,1608	1	SA	
RR20	2007-000071	R-CHIP;22ohm,5%,1/10W,TP,1608	1	SA	
RR21	2007-000431	R-CHIP;16Kohm,5%,1/10W,TP,1608	1	SA	
RR22	2007-000109	R-CHIP;1Mohm,5%,1/10W,TP,1608	1	SA	
RR23	2007-000065	R-CHIP;2.2Mohm,5%,1/10W,TP,1608	1	SA	

Loc.No	Part No	Description ; Specification	Q'ty	S.N.A	Remark
RR24	2007-000071	R-CHIP;22ohm,5%,1/10W,TP,1608	1	SA	
RR25	2007-000092	R-CHIP;15Kohm,5%,1/10W,TP,1608	1	SA	
RR26	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
RR27	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
RR28	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
RR29	2007-001056	R-CHIP;6.2Kohm,5%,1/10W,TP,1608	1	SA	
RR3	2007-000591	R-CHIP;22ohm,1%,1/10W,TP,1608	1	SA	
RR30	2007-000097	R-CHIP;47Kohm,5%,1/10W,TP,1608	1	SA	
RR31	2007-000616	R-CHIP;24Kohm,5%,1/10W,TP,1608	1	SA	
RR32	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
RR33	2007-000098	R-CHIP;56Kohm,5%,1/10W,TP,1608	1	SA	
RR34	2007-000084	R-CHIP;4.7Kohm,5%,1/10W,TP,1608	1	SA	
RR35	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
RR36	2007-000078	R-CHIP;1Kohm,5%,1/10W,TP,1608	1	SA	
RR37	2007-000097	R-CHIP;47Kohm,5%,1/10W,TP,1608	1	SA	
RR38	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
RR39	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
RR4	2007-000591	R-CHIP;22ohm,1%,1/10W,TP,1608	1	SA	
RR40	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
RR400	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
RR41	2007-000309	R-CHIP;10ohm,5%,1/10W,TP,1608	1	SA	
RR42	2007-000309	R-CHIP;10ohm,5%,1/10W,TP,1608	1	SA	
RR5	2007-000102	R-CHIP;100Kohm,5%,1/10W,TP,1608	1	SA	
RR6	2007-000102	R-CHIP;100Kohm,5%,1/10W,TP,1608	1	SA	
RR7	2007-000616	R-CHIP;24Kohm,5%,1/10W,TP,1608	1	SA	
RR8	2007-000079	R-CHIP;1.8Kohm,5%,1/10W,TP,1608	1	SA	
RR9	2007-000090	R-CHIP;10Kohm,5%,1/10W,TP,1608	1	SA	
U13	1107-001546	IC-FLASH MEMORY;29LV400B,512Kx8/256Kx16B	1	SA	
U8	AK13-00017A	IC ASIC;S5L1482A01,BD-R1000,256,3.3V,0	1	SNA	
U13	1107-001369	IC-FLASH MEMORY;29LV800,1Mx8/512Kx16,TSO	1	SA	
UB1	1105-001305	IC-DRAM;4S641632,1MX16X4BIT,TSOP,54P,4	1	SA	
UC1	2203-000998	C-CER,CHIP;0.047NF,5%,50V,C0G,TP,1608	1	SA	
UC10	2404-000284	C-TA,CHIP;10uF,20%,16V,-,TP,3528	1	SA	
UC11	2404-000284	C-TA,CHIP;10uF,20%,16V,-,TP,3528	1	SA	
UC12	2404-000284	C-TA,CHIP;10uF,20%,16V,-,TP,3528	1	SA	
UC13	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
UC14	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
UC15	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
UC16	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
UC17	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
UC18	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
UC19	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
UC2	2203-000998	C-CER,CHIP;0.047NF,5%,50V,C0G,TP,1608	1	SA	
UC20	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
UC21	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
UC22	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
UC23	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
UC24	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
UC25	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
UC26	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
UC27	2203-000440	C-CER,CHIP;1nF,10%,50V,X7R,TP,1608,-	1	SA	
UC28	2203-000257	C-CER,CHIP;10nF,10%,50V,X7R,TP,1608	1	SA	
UC29	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
UC3	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
UC30	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	

Loc.No	Part No	Description ; Specification	Q'ty	S.N.A	Remark
UC31	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
UC32	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
UC33	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
UC34	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
UC35	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
UC36	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
UC37	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
UC38	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
UC39	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
UC4	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
UC40	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
UC41	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
UC42	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
UC43	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
UC44	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
UC45	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
UC46	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
UC48	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
UC49	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
UC5	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
UC50	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
UC51	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
UC52	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
UC53	2404-000284	C-TA,CHIP;10uF,20%,16V,-,TP,3528	1	SA	
UC54	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
UC55	2404-000284	C-TA,CHIP;10uF,20%,16V,-,TP,3528	1	SA	
UC56	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
UC57	2404-000284	C-TA,CHIP;10uF,20%,16V,-,TP,3528	1	SA	
UC58	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
UC59	2404-000284	C-TA,CHIP;10uF,20%,16V,-,TP,3528	1	SA	
UC6	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
UC60	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
UC61	2203-000357	C-CER,CHIP;0.15NF,5%,50V,C0G,TP,1608	1	SA	
UC62	2203-001071	C-CER,CHIP;0.056NF,5%,50V,C0G,TP,1608	1	SA	
UC63	2203-000384	C-CER,CHIP;0.015NF,5%,50V,C0G,TP,1608	1	SA	
UC64	2203-000236	C-CER,CHIP;0.1NF,5%,50V,C0G,TP,1608	1	SA	
UC65	2203-000236	C-CER,CHIP;0.1NF,5%,50V,C0G,TP,1608	1	SA	
UC66	2203-000236	C-CER,CHIP;0.1NF,5%,50V,C0G,TP,1608	1	SA	
UC67	2203-000236	C-CER,CHIP;0.1NF,5%,50V,C0G,TP,1608	1	SA	
UC68	2203-000236	C-CER,CHIP;0.1NF,5%,50V,C0G,TP,1608	1	SA	
UC69	2203-000236	C-CER,CHIP;0.1NF,5%,50V,C0G,TP,1608	1	SA	
UC7	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
UC70	2203-000236	C-CER,CHIP;0.1NF,5%,50V,C0G,TP,1608	1	SA	
UC71	2203-000236	C-CER,CHIP;0.1NF,5%,50V,C0G,TP,1608	1	SA	
UC72	2203-000236	C-CER,CHIP;0.1NF,5%,50V,C0G,TP,1608	1	SA	
UC73	2203-000236	C-CER,CHIP;0.1NF,5%,50V,C0G,TP,1608	1	SA	
UC74	2203-000236	C-CER,CHIP;0.1NF,5%,50V,C0G,TP,1608	1	SA	
UC75	2203-000236	C-CER,CHIP;0.1NF,5%,50V,C0G,TP,1608	1	SA	
UC76	2203-000236	C-CER,CHIP;0.1NF,5%,50V,C0G,TP,1608	1	SA	
UC77	2203-000236	C-CER,CHIP;0.1NF,5%,50V,C0G,TP,1608	1	SA	
UC78	2203-000236	C-CER,CHIP;0.1NF,5%,50V,C0G,TP,1608	1	SA	
UC79	2203-000236	C-CER,CHIP;0.1NF,5%,50V,C0G,TP,1608	1	SA	
UC8	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
UC9	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
UR1	2011-000475	R-NET;33OHM,5%,1/16W,L,CHIP,8P,TP,32	1	SA	
UR10	2007-000115	R-CHIP;82ohm,5%,1/10W,TP,1608	1	SA	
UR11	2007-000115	R-CHIP;82ohm,5%,1/10W,TP,1608	1	SA	
UR12	2007-000071	R-CHIP;22ohm,5%,1/10W,TP,1608	1	SA	
UR13	2007-000071	R-CHIP;22ohm,5%,1/10W,TP,1608	1	SA	
UR14	2007-000115	R-CHIP;82ohm,5%,1/10W,TP,1608	1	SA	
UR15	2007-000072	R-CHIP;47ohm,5%,1/10W,TP,1608	1	SA	
UR16	2007-000109	R-CHIP;1Mohm,5%,1/10W,TP,1608	1	SA	
UR18	2007-000704	R-CHIP;3.6Kohm,5%,1/10W,TP,1608	1	SA	
UR2	2011-000475	R-NET;33OHM,5%,1/16W,L,CHIP,8P,TP,32	1	SA	
UR20	2007-000090	R-CHIP;10Kohm,5%,1/10W,TP,1608	1	SA	
UR21	2007-000090	R-CHIP;10Kohm,5%,1/10W,TP,1608	1	SA	
UR22	2007-000090	R-CHIP;10Kohm,5%,1/10W,TP,1608	1	SA	
UR23	2007-000090	R-CHIP;10Kohm,5%,1/10W,TP,1608	1	SA	
UR24	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
UR25	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
UR26	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
UR27	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
UR28	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
UR29	2007-000084	R-CHIP;4.7Kohm,5%,1/10W,TP,1608	1	SA	
UR3	2011-000475	R-NET;33OHM,5%,1/16W,L,CHIP,8P,TP,32	1	SA	
UR30	2007-000082	R-CHIP;3.3Kohm,5%,1/10W,TP,1608	1	SA	
UR31	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
UR32	2007-000134	R-CHIP;33Kohm,5%,1/10W,TP,1608	1	SA	
UR36	2007-000078	R-CHIP;1Kohm,5%,1/10W,TP,1608	1	SA	
UR37	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
UR38	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
UR39	2007-000125	R-CHIP;3.9Kohm,5%,1/10W,TP,1608	1	SA	
UR4	2011-000475	R-NET;33OHM,5%,1/16W,L,CHIP,8P,TP,32	1	SA	
UR40	2007-000090	R-CHIP;10Kohm,5%,1/10W,TP,1608	1	SA	
UR42	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
UR44	2007-000090	R-CHIP;10Kohm,5%,1/10W,TP,1608	1	SA	
UR45	2007-000084	R-CHIP;4.7Kohm,5%,1/10W,TP,1608	1	SA	
UR48	2007-000084	R-CHIP;4.7Kohm,5%,1/10W,TP,1608	1	SA	
UR49	2007-000084	R-CHIP;4.7Kohm,5%,1/10W,TP,1608	1	SA	
UR5	2011-001085	R-NET;82OHM,5%,1/16W,L,CHIP,8P,TP	1	SA	
UR50	2007-000119	R-CHIP;560ohm,5%,1/10W,TP,1608	1	SA	
UR51	2007-000124	R-CHIP;2.2Kohm,5%,1/10W,TP,1608	1	SA	
UR52	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
UR54	2007-000084	R-CHIP;4.7Kohm,5%,1/10W,TP,1608	1	SA	
UR55	2007-000084	R-CHIP;4.7Kohm,5%,1/10W,TP,1608	1	SA	
UR58	2007-000124	R-CHIP;2.2Kohm,5%,1/10W,TP,1608	1	SA	
UR59	2007-000121	R-CHIP;820ohm,5%,1/10W,TP,1608	1	SA	
UR6	2007-000115	R-CHIP;82ohm,5%,1/10W,TP,1608	1	SA	
UR60	2007-000090	R-CHIP;10Kohm,5%,1/10W,TP,1608	1	SA	
UR61	2007-000090	R-CHIP;10Kohm,5%,1/10W,TP,1608	1	SA	
UR62	2007-000090	R-CHIP;10Kohm,5%,1/10W,TP,1608	1	SA	
UR63	2007-000090	R-CHIP;10Kohm,5%,1/10W,TP,1608	1	SA	
UR65	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
UR66	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
UR68	2007-000090	R-CHIP;10Kohm,5%,1/10W,TP,1608	1	SA	
UR69	2007-000090	R-CHIP;10Kohm,5%,1/10W,TP,1608	1	SA	
UR7	2007-000071	R-CHIP;22ohm,5%,1/10W,TP,1608	1	SA	
UR71	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
UR72	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
UR73	3301-001419	BEAD-SMD;-,220,-,500,TP,-,0.3	1	SA	

Loc.No	Part No	Description ; Specification	Q'ty	S.N.A	Remark
UR74	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
UR75	3301-001419	BEAD-SMD;-,220,-,500,TP,-,0.3	1	SA	
UR76	3301-001419	BEAD-SMD;-,220,-,500,TP,-,0.3	1	SA	
UR77	3301-001419	BEAD-SMD;-,220,-,500,TP,-,0.3	1	SA	
UR78	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
UR8	2007-000115	R-CHIP;82ohm,5%,1/10W,TP,1608	1	SA	
UR9	2007-000071	R-CHIP;22ohm,5%,1/10W,TP,1608	1	SA	
VC1	2203-000843	C-CER,CHIP;39nF,10%,25V,X7R,TP,1608,-	1	SA	
VC10	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
VC11	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
VC12	2404-000284	C-TA,CHIP;10uF,20%,16V,-,TP,3528	1	SA	
VC13	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
VC14	2203-000257	C-CER,CHIP;10nF,10%,50V,X7R,TP,1608	1	SA	
VC15	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
VC16	2404-000212	C-TA,CHIP;3.3uF,20%,25V,-,TP,3528	1	SA	
VC19	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
VC2	2203-000843	C-CER,CHIP;39nF,10%,25V,X7R,TP,1608,-	1	SA	
VC20	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
VC21	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
VC23	2203-005148	C-CER,CHIP;100nF,10%,16V,X7R,TP,1608	1	SA	
VC3	2203-000843	C-CER,CHIP;39nF,10%,25V,X7R,TP,1608,-	1	SA	
VC4	2203-000843	C-CER,CHIP;39nF,10%,25V,X7R,TP,1608,-	1	SA	
VC5	2203-000843	C-CER,CHIP;39nF,10%,25V,X7R,TP,1608,-	1	SA	
VC6	2203-000843	C-CER,CHIP;39nF,10%,25V,X7R,TP,1608,-	1	SA	
VC7	2203-000491	C-CER,CHIP;2.2nF,10%,50V,X7R,TP,1608,-	1	SA	
VC8	2203-000491	C-CER,CHIP;2.2nF,10%,50V,X7R,TP,1608,-	1	SA	
VC9	2203-000491	C-CER,CHIP;2.2nF,10%,50V,X7R,TP,1608,-	1	SA	
VIC1	1003-001780	IC-MOTOR DRIVER;BD7954FS,SSOP,54P,22x11.	1	SA	
VR1	2007-000074	R-CHIP;100ohm,5%,1/10W,TP,1608	1	SA	
VR10	2007-000034	R-CHIP;1OHM,5%,1/4W,TP,3216	1	SA	
VR11	2007-000034	R-CHIP;1OHM,5%,1/4W,TP,3216	1	SA	
VR12	2007-000034	R-CHIP;1OHM,5%,1/4W,TP,3216	1	SA	
VR13	2007-000502	R-CHIP;2.2ohm,5%,1/8W,TP,2012	1	SA	
VR14	2007-000502	R-CHIP;2.2ohm,5%,1/8W,TP,2012	1	SA	
VR15	2007-000502	R-CHIP;2.2ohm,5%,1/8W,TP,2012	1	SA	
VR16	2007-000502	R-CHIP;2.2ohm,5%,1/8W,TP,2012	1	SA	
VR17	2007-000965	R-CHIP;5.1Kohm,5%,1/10W,TP,1608	1	SA	
VR18	2007-000074	R-CHIP;100ohm,5%,1/10W,TP,1608	1	SA	
VR19	2007-000093	R-CHIP;20Kohm,5%,1/10W,TP,1608	1	SA	
VR2	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
VR20	2007-000093	R-CHIP;20Kohm,5%,1/10W,TP,1608	1	SA	
VR21	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	1	SA	
VR22	2007-000090	R-CHIP;10Kohm,5%,1/10W,TP,1608	1	SA	
VR23	2007-000029	R-CHIP;0ohm,5%,1/8W,TP,2012	1	SA	
VR24	2007-000029	R-CHIP;0ohm,5%,1/8W,TP,2012	1	SA	
VR27	2007-000090	R-CHIP;10Kohm,5%,1/10W,TP,1608	1	SA	
VR28	2007-000090	R-CHIP;10Kohm,5%,1/10W,TP,1608	1	SA	
VR3	2007-000090	R-CHIP;10Kohm,5%,1/10W,TP,1608	1	SA	
VR4	2007-000090	R-CHIP;10Kohm,5%,1/10W,TP,1608	1	SA	
VR5	2007-000090	R-CHIP;10Kohm,5%,1/10W,TP,1608	1	SA	
VR6	2007-000029	R-CHIP;0ohm,5%,1/8W,TP,2012	1	SA	
VR7	2007-001179	R-CHIP;8.2Kohm,5%,1/10W,TP,1608	1	SA	
VR8	2007-001179	R-CHIP;8.2Kohm,5%,1/10W,TP,1608	1	SA	
VR9	2007-000034	R-CHIP;1OHM,5%,1/4W,TP,3216	1	SA	
Y1	2801-004180	CRYSTAL-SMD;33.8688MHZ,50PPM,28-AAN,12PF	1	SA	

Loc.No	Part No	Description ; Specification	Q'ty	S.N.A	Remark
	AC99-90119M	ASSY PCB-FRONT END,m;SV-R250,FRONT-END P	1	SNA	
	0202-001087	SOLDER-WIRE FLUX;KR19,-,D0.6,60SN/40PB,F	0.167	SNA	
H001	AK97-01202A	ASSY-RECORDER DECK;ASSY,DP-R2,DP-R2	1	SNA	
S.N.A	6003-001449	SCREW-TAPTITE;BH,+,B,M2.6,L6,NI PLT	5	SA	
S.N.A.	6003-001199	SCREW-TAPTITE;PWH,+,B,M2,L7,ZPC(YEL),SWR	4	SA	
H108	AK63-00216A	TRAY-DISC;DP-RW,ABS,-,-,-,-,-,-	1	SNA	
S.N.A.	AK97-01203A	ASSY-FRAME MAIN;ASSY,DP-R2,DP-R2	1	SNA	
S.N.A.	6003-001449	SCREW-TAPTITE;BH,+,B,M2.6,L6,NI PLT	2	SA	
H105	6602-001076	BELT-RECTANGULAR;CR,T1.2,4.3%,1.2X25.1,B	1	SA	
H401	AK61-00400A	FRAME-MAIN;DP-RW,ABS,-,-,BLK,-,-,-,-	1	SNA	
H209	AK64-01010A	CHASSIS-SUB;DP-RW,ABS,-,-,-,BLK,-	1	SNA	
T037	AK66-00060A	SLIDER-CAM;DP-RW,POM,-,-,-,WHT,-	1	SNA	
H103	AK66-00061A	GEAR-PULLEY;DP-RW,POM,-,-,-,-,-,BLK,-	1	SNA	
H106	AK66-00062A	GEAR-TRAY;DP-RW,POM,-,-,-,WHT,-,-,-	1	SNA	
H213	AK97-01204A	ASSY-PCB MOTOR;ASSY,DP-R2,DP-R2	1	SNA	
S.N.A.	3409-001138	SWITCH-DETECTOR;5V DC,1A,DPST,30GF,-	1	SA	
S.N.A.	AK41-00319A	PCB-MOTOR;DP-R2,PHENOL,1,00,T1.6,53*26,?	1	SNA	
S.N.A.	AK41-00320A	FFC-HOUSING;DP-R2,PITCH1.0,PET,6P,T0.13,	1	SNA	
S.N.A.	AK97-01205A	ASSY-MOTOR;ASSY,DP-R2,DP-R2	1	SNA	
S.N.A.	AK31-00001A	MOTOR-LOADING;RF-300EH-1D390,DP-9,160MA,	1	SA	
S.N.A.	AK66-00038A	PULLEY MOTOR;DP-R1,POM,-,BLK,1.95,7,4.1,	1	SNA	
S.N.A.	AK97-01206A	ASSY-COVER;ASSY,DP-R2,DP-R2	1	SNA	
S.N.A.	AK63-00213A	COVER-CLAMPER DISC PU;DP-RW,SECC,0.6t,-,	1	SNA	
S.N.A.	AK63-00215A	COVER-UPPER;DP-RW,SECC,T0.6,-,-,-,-,-,-	1	SNA	
S.N.A.	AK68-00433A	LABEL WARNING-DRIVE;DP-R1,-,ART PAPER,T0	1	SNA	
S.N.A.	AK97-01208A	ASSY-CLAMPER;ASSY,DP-R2,DP-R2	1	SNA	
H102	AK61-00397A	BODY CLAMPER-DISC;DP-RW,POM,T1.0,-,-,-,W	1	SNA	
S.N.A.	AK61-00398A	BRACKET-MAGNET;DP-RW,SECC,T0.6,-,-,-,-	1	SNA	
S.N.A.	BG33-30001D	MAGNET-CLAMPER;-,-,-,-,13.5x6x1.1	1	SNA	
S.N.A.	AK97-01207A	ASSY-TRAVERSE;ASSY,DP-R2,DP-R2	1	SNA	
S.N.A.	6001-001291	SCREW-MACHINE;CH(0.5),*,-,M1.7,L4,ZPC(BL	3	SA	
S.N.A.	6003-001148	SCREW-TAPTITE;PH,+,B,M1.7,L6,ZPC(BLK),SW	1	SA	
W018	6003-001450	SCREW-TAPTITE;PH,+,S,M2.6,L5,ZPC(YEL)	2	SA	
S.N.A.	6009-001472	SCREW-SPECIAL;CH,HEX,-,M2.6,L6,BLUE SKY,	4	SNA	
H207	AK31-00023A	MOTOR SPINDLE;DP-RW,8500 rpm,9.8 mN.m,DC	1	SNA	
S.N.A.	AK31-00024A	MOTOR STEP-FEED;-,DP-RW,727 mA,2000 ppc,	1	SNA	
H241	AK41-00324A	FFC-PU;DP-R2,PITCH : 0.5,PET,50P,T0.0	1	SNA	
H265	AK61-00402A	BRACKET-SHAFT PU;DP-RW,SUS,T1.0,-,-,-,-	4	SNA	
H271	AK61-00415A	HINGE-PU;DP-R2,POM,-,-,-,-,-,-	1	SNA	
S.N.A.	AK61-00416A	BRACKET-DECK;DP-R2,SECC,T2.0,-,-,-,-	1	SNA	
H268	AK61-00452A	SPRING ETC-HINGE PU;DP-R2,SUS304WPB,0.2,	1	SNA	
H275	AK66-00040A	SHAFT-PU;DP-R1,SUS420J2,L87.8MM,3MM,-,H	2	SNA	
S.N.A.	AK73-00031A	RUBBER-DAMPER;DP-RW,Butyl,-,-,9.3,-,-,-,	4	SNA	
H211	AK97-01179A	ASSY-PICK UP;ZN,SOH-DR2,-	1	SNA	
S.N.A	0201-000169	ADHESIVE-CYA;ARCN-A501F,NTR	0.02	SNA	
S.N.A	0201-001175	ADHESIVE-AA;#7452,TRP,0.4MPA.S,GRAM	0.03	SNA	
S.N.A	0201-001411	ADHESIVE-UV;8833,YEL,50000,250G/1BTL	0.029	SNA	
S.N.A	0201-001525	ADHESIVE-UV;8840L,YEL,TRANS,23000,DISCMA	0.06	SNA	
S.N.A	0202-001214	SOLDER-WIRE FLUX;HI-ALMIT HR19M LFM2,-,D	0.2	SNA	
S.N.A	AH68-00464J	LABEL-STICKER;SOH-DR2,-,ART PAPER,-,W7.0	1	SNA	
S.N.A	AK97-01180A	ASSY-SUB PICK UP;ZN,SOH-DR2,-	1	SNA	
S.N.A	0201-001411	ADHESIVE-UV;8833,YEL,50000,250G/1BTL	0.01	SNA	
S.N.A	0201-001536	ADHESIVE-UV;#8840,YEL,31000mPa,-	0.008	SNA	
S.N.A	0202-001214	SOLDER-WIRE FLUX;HI-ALMIT HR19M LFM2,-,D	0.065	SNA	
W212	6003-001251	SCREW-TAPTITE;CH,+,B,M1.7,L3,ZPC(YEL),SW	1	SA	

Loc.No	Part No	Description ; Specification	Q'ty	S.N.A	Remark
S.N.A	AK97-01181A	ASSY-OPT;ZN,SOH-DR2,-	1	SNA	
S.N.A	0201-001411	ADHESIVE-UV;8833,YEL,50000,250G/1BTL	0.072	SNA	
S.N.A	0201-001536	ADHESIVE-UV;#8840,YEL,31000mPa,-	0.086	SNA	
S.N.A	0201-001718	ADHESIVE-A.C.F;A-80T,SILVER,11000-12000C	0.005	SNA	
W212	6003-001251	SCREW-TAPTITE;CH,+,B,M1.7,L3,ZPC(YEL),SW	2	SA	
S.N.A	AK01-00001A	POL NORMAL-DR2 FILTER;ASN 3242 TP,-,-,29	1	SNA	
S.N.A	AK61-00231A	SPRING ETC-CCL;-,STS,-,-,-,L6.3,-,T0.95,	1	SNA	
S.N.A	AK61-00432A	BASE;SOH-DR2,ZnDC,T8.5,W64,L27,GRY,	1	SNA	
S.N.A	AK67-00012A	LENS-DR1 CL;SHO-DR1,PLASTIC,NTR,•'6.6,T1	1	SNA	
S.N.A	AK67-00014A	LENS-DR1 MCBS;SOH-DR1,B270,NTR,9.0*4.5,T	1	SNA	
S.N.A	AK67-00015A	LENS-MR;SOH-DR1,B270,NTR,7.0*7.6,T2.5,	1	SNA	
S.N.A	AK67-00032A	LENS-CONCAVE;SOH-DR2,ZEONEX,-,10*5.7,4,-	1	SNA	
S.N.A	AK97-01182A	ASSY-DVD LD;ZN,SOH-DR2,-	1	SNA	
S.N.A	0201-001411	ADHESIVE-UV;8833,YEL,50000,250G/1BTL	0.006	SNA	
S.N.A	0602-001112	DIODE-LASER;180mW,2,658nm,-	1	SNA	
S.N.A	6001-001719	SCREW-MACHINE;CH,+,M1.7,L4,NI PLT	1	SA	
S.N.A	AK41-00357A	FPC-LD;SOH-DR2,00,COVERLAY,-,-,5.0*7.	1	SNA	
S.N.A	AK61-00448A	HOLDER-DVD LD;SOH-DR2,ZnDC,-,W8.2,L22.6,	1	SNA	
S.N.A	AK67-00011B	LENS-HWP;SOH-DR2,GLA,-,2.3*2.5,1.13,-,-	1	SNA	
S.N.A	AK97-01183A	ASSY-CD LD;ZN,SOH-DR2,-	1	SNA	
S.N.A	0201-001411	ADHESIVE-UV;8833,YEL,50000,250G/1BTL	0.014	SNA	
S.N.A	0602-001093	LASER-HOLOGRAM;4.3mW,2V,30V	1	SNA	
S.N.A	AK61-00229B	HOLDER-HOE;SOH-DR2,Zn,T2.3,W14,L5.4,GRY,	1	SNA	
S.N.A	AK97-01190A	ASSY-ACT;-,SOH-DR2,-	1	SNA	
S.N.A	0201-000180	ADHESIVE-UV;PDS-326UV,BLU	0.01	SNA	
S.N.A	0201-001081	ADHESIVE-AA;1401C,RED,-,BOND-LOCK SCREW	0.006	SNA	
S.N.A	0201-001230	ADHESIVE-CYA;LOCTITE 480,BLK,300,-	0.002	SNA	
S.N.A	0201-001371	ADHESIVE-SIL;KE3494,GRAY,50 PA,OL PROTEC	0.001	SNA	
S.N.A	0201-001421	ADHESIVE-UV;SDM-118,TRP,5500,250G/BTL	0.05	SNA	
S.N.A	0201-001709	ADHESIVE-UV;8839L,YEL,24500mPa.s,-	0.01	SNA	
S.N.A	0202-001214	SOLDER-WIRE FLUX;HI-ALMIT HR19M LFM2,-,D	0.051	SNA	
S.N.A	3302-001621	MAGNET-RARE EARTH;AF,-,13500Gauss,45MGOe	2	SNA	
S.N.A	3812-001248	WIRE-NO SHEATH CU;SCW,-,20MM,-,-,SILVER	1	SNA	
S.N.A	3812-001263	WIRE-NO SHEATH CU;SCW,-,19MM,-,-,WHT	5	SNA	
S.N.A	6003-001526	SCREW-TAPTITE;CH,+,S-TITE,M1.4,L4,ZPC(BL	2	SNA	
S.N.A	AK61-00390A	HOLDER-WIRE;SOH-DR2,PPS,T5.2,W14.1,L6.78	1	SNA	
S.N.A	AK62-00017A	YOKE-BASE;SOH-DR2,SPCC,T5.3,W22.3,L14.5,	1	SNA	
S.N.A	AK67-00010B	LENS-HOE;SOH-DR1,GLASS & POLYMER,NTR,4,	1	SNA	
S.N.A	AK67-00013A	LENS-DR1 OL;SOH-DR1,PLASTIC,NTR,•'5.0,T1	1	SNA	
S.N.A	AK97-01184A	ASSY-BLADE;-,SOH-DR2,-	1	SNA	
S.N.A	0201-001253	ADHESIVE-STR;TB2212B,BLK,25(250),TB2065C	0.004	SNA	
S.N.A	0201-001371	ADHESIVE-SIL;KE3494,GRAY,50 PA,OL PROTEC	0.001	SNA	
S.N.A	0201-001388	ADHESIVE-CYA;LOCTITE 460,WHT,45 MPA.S,-	0.001	SNA	
S.N.A	0202-001215	SOLDER-BAR;HSE-16,S60S-20,D3,SN/0.5CU/0.	0.01	SNA	
S.N.A	AK61-00449A	BLADE;SOH-DR2,E5006L,IVORY,13*7.4*8.	1	SNA	
S.N.A	AK97-01191A	ASSY-FPCB;-,SOH-DR2,-	1	SNA	
S.N.A	0202-001214	SOLDER-WIRE FLUX;HI-ALMIT HR19M LFM2,-,D	0.065	SNA	
S.N.A	0603-001141	PHOTO-RECEIVER;5.5V,-,40mA,660nm,-	1	SNA	
S.N.A	0603-001174	PHOTO-RECEIVER;6V,-,-,660nm,FPD	1	SNA	
S.N.A	1003-001662	IC-DIODE DRIVER;EL6912,LPP,32P,5x6mm,-,3	1	SNA	
S.N.A	1404-001328	THERMISTOR-NTC;10Kohm,-,3370K,-,-,-,TP	1	SNA	
S.N.A	2007-000070	R-CHIP;0ohm,5%,1/10W,TP,1608	2	SA	
S.N.A	2007-000075	R-CHIP;220ohm,5%,1/10W,TP,1608	1	SA	
S.N.A	2007-000116	R-CHIP;120ohm,5%,1/10W,TP,1608	1	SA	
S.N.A	2007-000120	R-CHIP;680ohm,5%,1/10W,TP,1608	1	SA	
S.N.A	2007-000869	R-CHIP;4.7Kohm,1%,1/10W,TP,1608	2	SA	
S.N.A	2007-000929	R-CHIP;470ohm,1%,1/10W,TP,1608	1	SA	
S.N.A	2104-001087	VR-SMD;2.2KOHM,25%,0.15W,TOP	2	SA	
S.N.A	2203-000189	C-CER,CHIP;100nF,+80-20%,25V,Y5V,TP,1608	8	SA	
S.N.A	2203-005065	C-CER,CHIP;1000nF,+80-20%,10V,Y5V,1608	2	SA	
S.N.A	2203-005664	C-CER,CHIP;4700nF,10%,6.3V,X5R,2012	1	SNA	
S.N.A	3301-001419	BEAD-SMD;-,220,-,500,TP,-,0.3	2	SA	
S.N.A	3708-002092	CONNECTOR-FPC/FFC/PIC;54P,0.5mm,SMD-A,SN	1	SA	
S.N.A	AK32-00004A	SENSOR PHOTO;CNB1001,-25~85,-,-,20~50mA,	1	SNA	
S.N.A	AK41-00358A	FPC-MAIN;SOH-DR2,00,COVERLAY,-,-,50.0*7	1	SNA	
S.N.A	AK61-00230B	PLATE-PD;SOH-DR2,Zn,T2.15,W13,L7.5,GRY,	1	SNA	
S.N.A	0201-000172	ADHESIVE-AA;EP-171,BRN	0.01	SNA	
S.N.A	AK63-00262A	GROUND-TERMINAL R;DP-R2,SECC,0.6T,-,-,SI	1	SNA	
S.N.A	AK63-00263A	GROUND-TERMINAL L;DP-R2,SECC,0.6T,-,-,SI	1	SNA	
W201	6001-001711	SCREW-MACHINE;PH,+,M3,L3.3,ZPC(YEL)	1	SA	
W291	6001-001712	SCREW-MACHINE;PH,+,M2,L8,	3	SA	
W019	6003-000108	SCREW-TAPTITE;BH,+,B,M2.6,L6,ZPC(YEL),SW	3	SA	
W001	6003-000275	SCREW-TAPTITE;BH,+,B,M3,L10,BLK ,SWCH101	11	SA	
W009	6003-000276	SCREW-TAPTITE;BH,+,B,M3,L10,ZPC(YEL),SWC	6	SA	
W202	6003-000277	SCREW-TAPTITE;BH,+,B,M3,L12,ZPC(YEL),SWR	8	SA	
W019	6003-001076	SCREW-TAPTITE;BH,+,-,S,M3,L6,ZPC(BLK),SW	1	SA	
W018	6003-001450	SCREW-TAPTITE;PH,+,S,M2.6,L5,ZPC(YEL)	1	SA	
W272	6003-001464	SCREW-TAPTITE;BH,+,B,M3,L10,ZPC(WHT)	8	SA	
W275	6003-001561	SCREW-TAPTITE;BH,+,-,B,M3,L6,ZPC(YEL),SW	10	SA	
W015	6006-001092	SCREW-MACHINE;WS,PH,+,M3.0,L6.0,ZPC(YEL)	3	SA	
W016	6006-001154	SCREW-TAPTITE;WSP,PH,+,M2.6,L5.6,ZPC(YEL	1	SA	
W271	6009-001411	SCREW-SPECIAL;TH,+,-,M5,L14,NI PLT,SWRCH	2	SA	
	AC39-00073A	CABLE-RCA;SJ01-08-099,1.2MT,3P,A/V,30A,5	1	SA	
	AC39-42001J	CABLE-RF ASSY;-,-,#1365,1200mm,3A,110V,C	1	SA	
W252	AC60-12126A	SCREW-MACHINE;-,-,FE,FZY,BH,-,-,4*12,-,-	4	SA	
I/B	AK68-00588A	MANUAL USERS;DVD-VR320/XAA,SEA,ENGLISH,U	1	SA	
	AK69-00356A	PACKING CASE;DVD-VR320/XAA,SW2,OFFSET,T0	1	SA	

MEMO

9. Block Diagrams

9-1 All Block Diagram- 9-2

9-2 AIC1(PCM1753) Audio DA Block Diagram - 9-3

9-3 AIC9(PCM1802) Audio AD Block Diagram - 9-4

9-4 DIC1(S5L3200) A/V Codec Block Diagram - 9-5

9-5 DIC3(29DL323) Flash MEM Block Diagram - 9-6

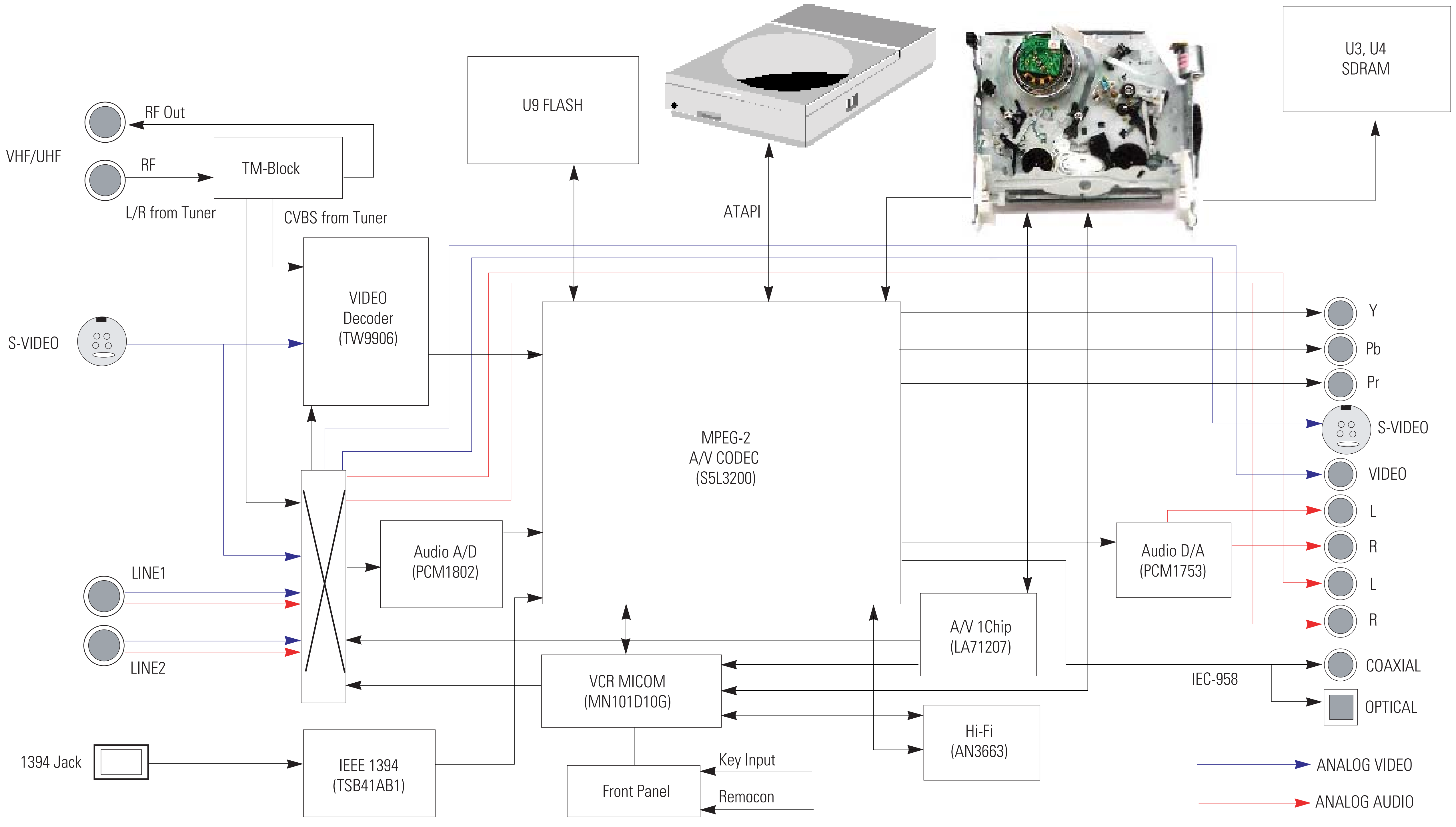
9-6 IC301(LA71207) A/V 1Chip Block Diagram - 9-7

9-7 IC501(LA71607M) Hi-Fi Block Diagram - 9-8

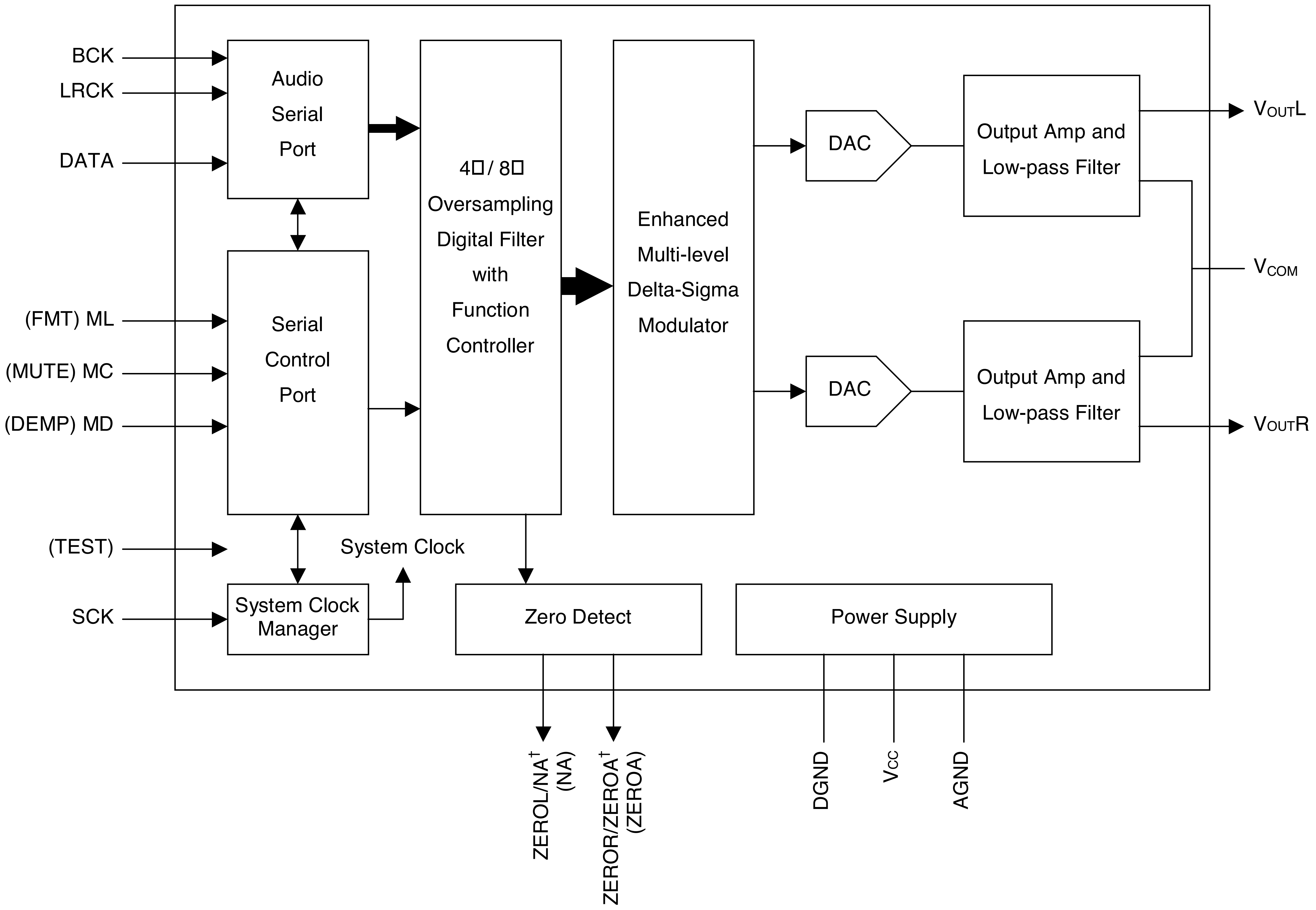
9-8 TIC1(TW9906) Video Decoder Block Diagram - 9-9

9-9 U3,U4 (HY5DU281622ETP-J) Dram Block Diagram - - - - - - - - - - - - - - - - - - - 9-10

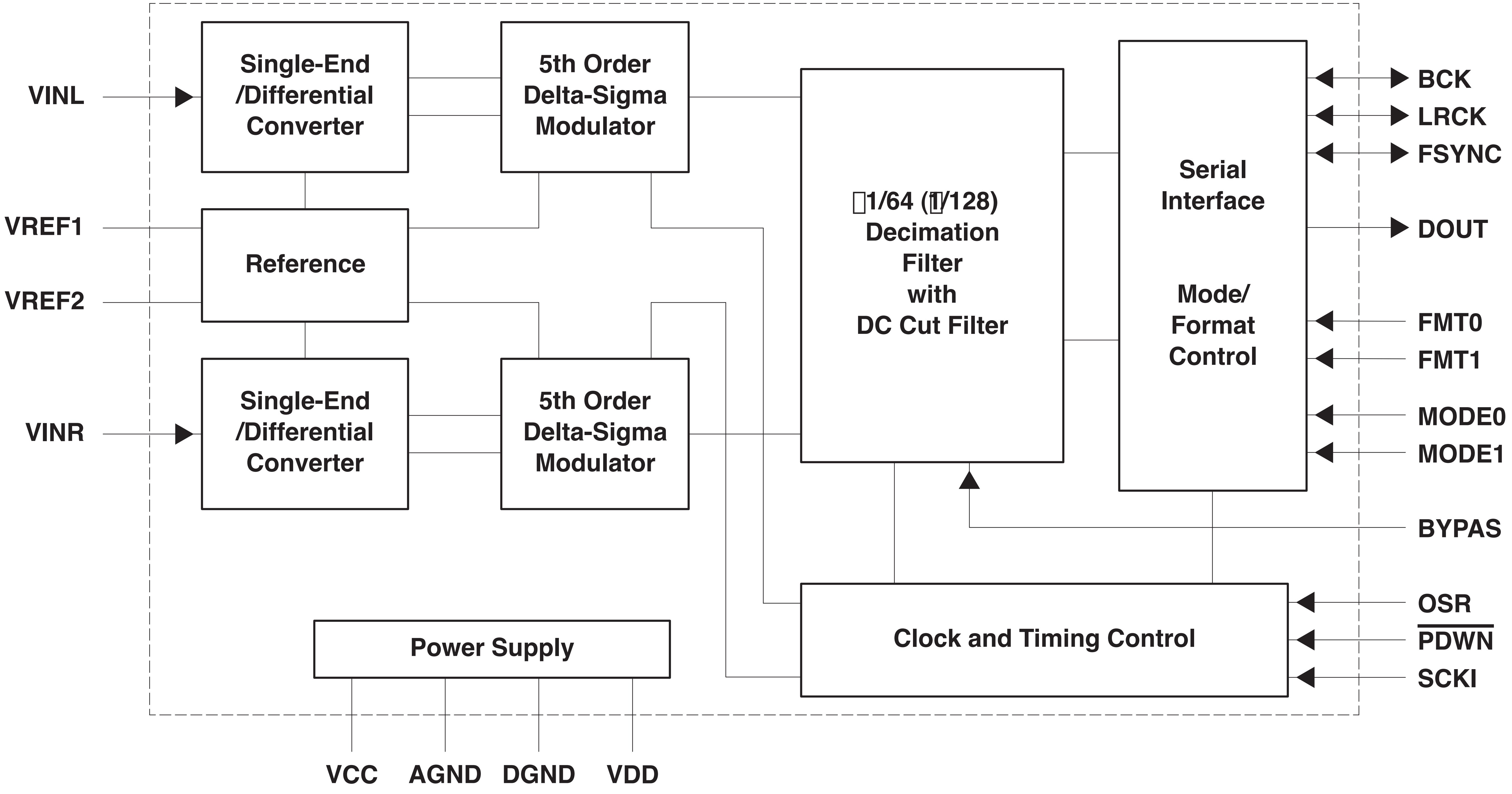
9-1 All Block Diagram


RF Out
VHF/UHF
RF
TM-Block
L/R from Tuner
CVBS from Tuner
U9 FLASH
ATAPI
U3, U4
SDRAM
S-VIDEO
VIDEO
Decoder
(TW9906)
MPEG-2
A/V CODEC
(S5L3200)
Y
Pb
Pr
S-VIDEO
VIDEO
L
R
L
R
LINE1
LINE2
Audio A/D
(PCM1802)
Audio D/A
(PCM1753)
A/V 1Chip
(LA71207)
COAXIAL
IEC-958
OPTICAL
VCR MICOM
(MN101D10G)
Hi-Fi
(AN3663)
1394 Jack
IEEE 1394
(TSB41AB1)
Front Panel
Key Input
Remocon
ANALOG VIDEO
ANALOG AUDIO

9-2 AIC1(PCM1753) Audio DA Block Diagram

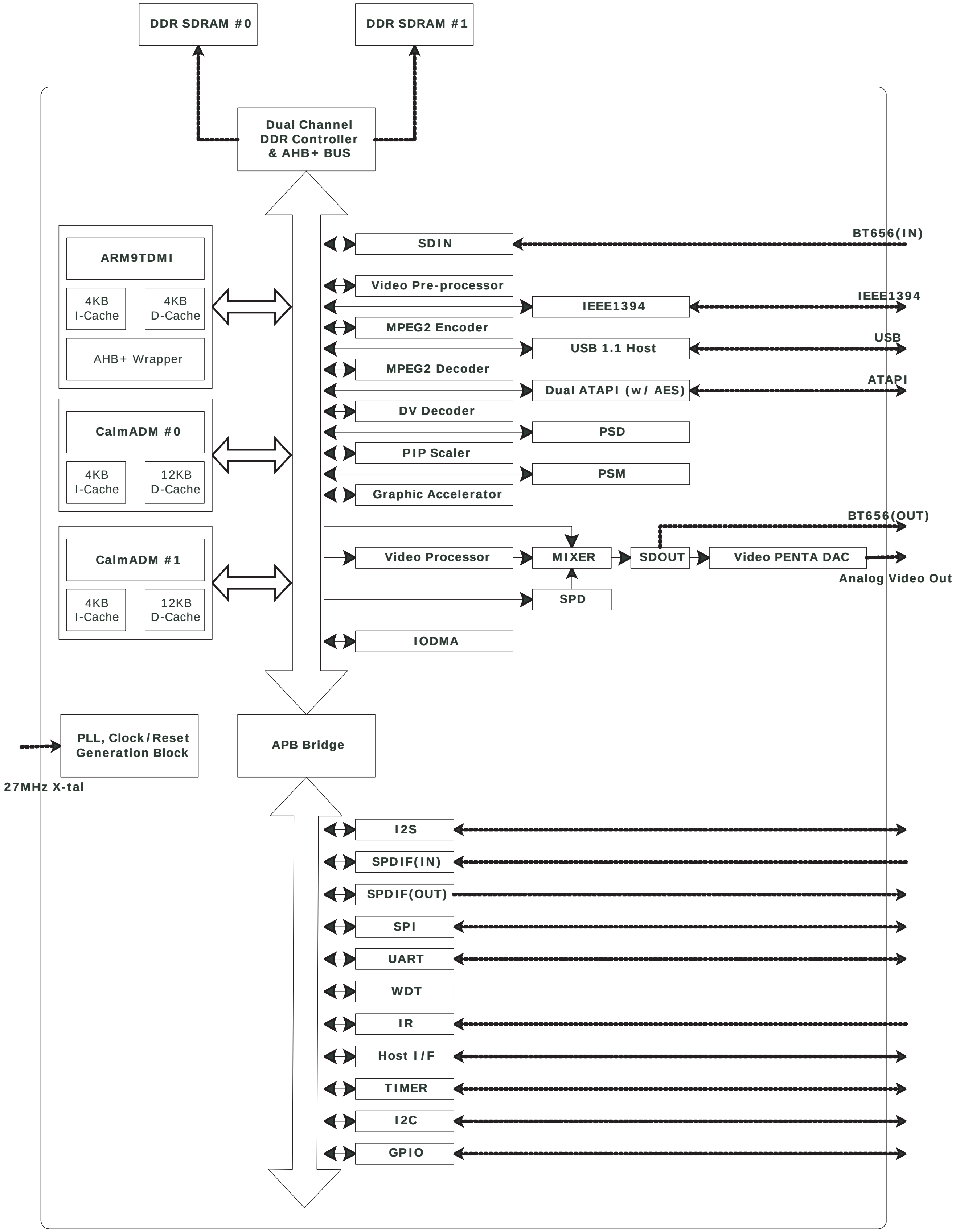

BCK
LRCK
DATA
Audio
Serial
Port
4□/ 8□
Oversampling
Digital Filter
with
Function
Controller
Enhanced
Multi-level
Delta-Sigma
Modulator
DAC
DAC
Output Amp and
Low-pass Filter
Output Amp and
Low-pass Filter
VOUTL
VCOM
VOUTR
(FMT) ML
(MUTE) MC
(DEMP) MD
Serial
Control
Port
(TEST)
System Clock
SCK
System Clock
Manager
Zero Detect
Power Supply
ZEROL/NA† (NA)
ZEROR/ZEROA† (ZEROA)
DGND
VCC
AGND

9-3 AIC9(PCM1802) Audio AD Block Diagram

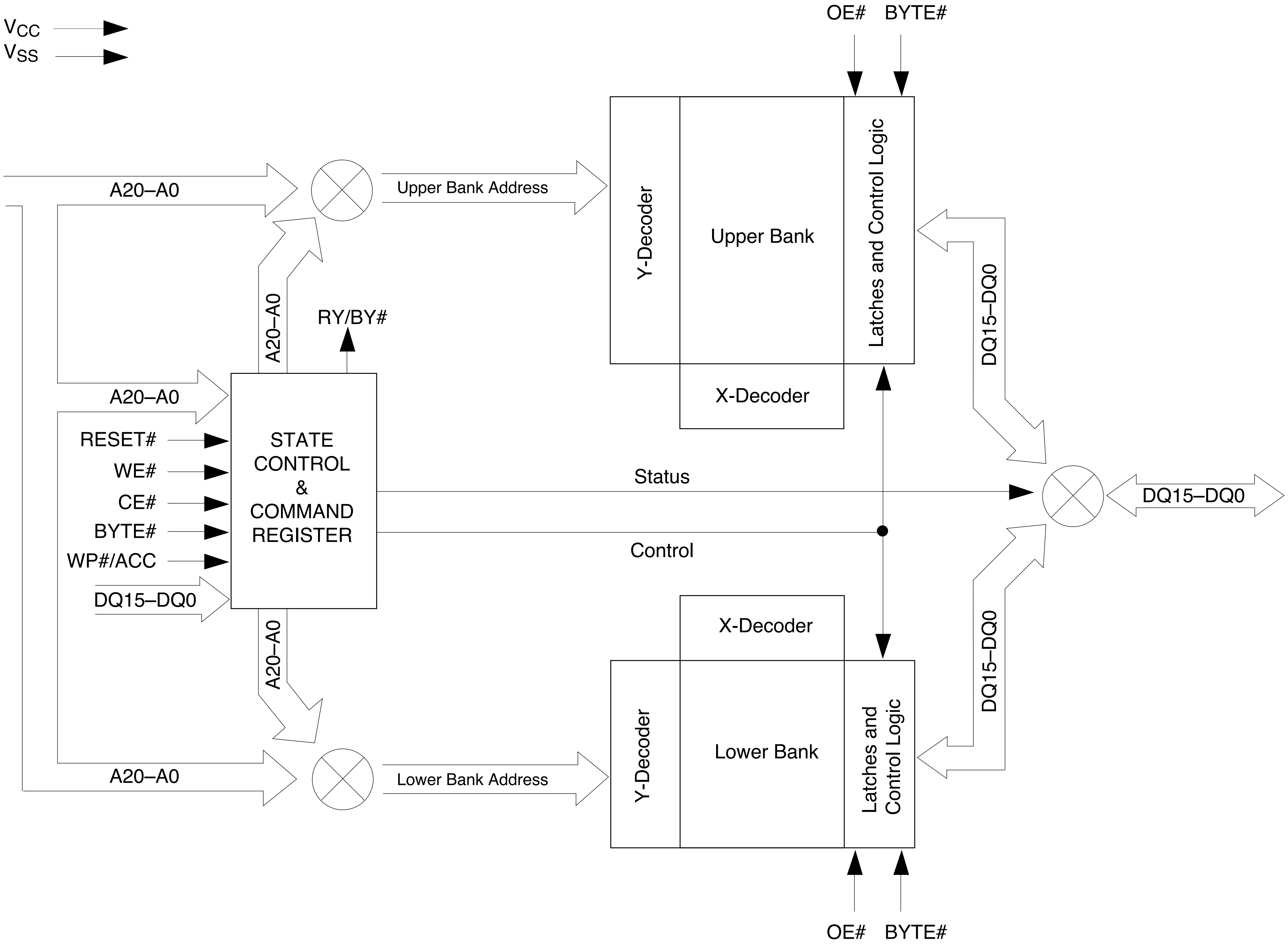

VINL
Single-End /Differential Converter
5th Order Delta-Sigma Modulator
VREF1
Reference
VREF2
VINR
Single-End /Differential Converter
5th Order Delta-Sigma Modulator
1/64 (1/128) Decimation Filter with DC Cut Filter
Serial Interface
Mode/ Format Control
BCK
LRCK
FSYNC
DOUT
FMT0
FMT1
MODE0
MODE1
BYPAS
OSR
PDWN
SCKI
Clock and Timing Control
Power Supply
VCC
AGND
DGND
VDD

This Document can not be used without Samsung's authorization

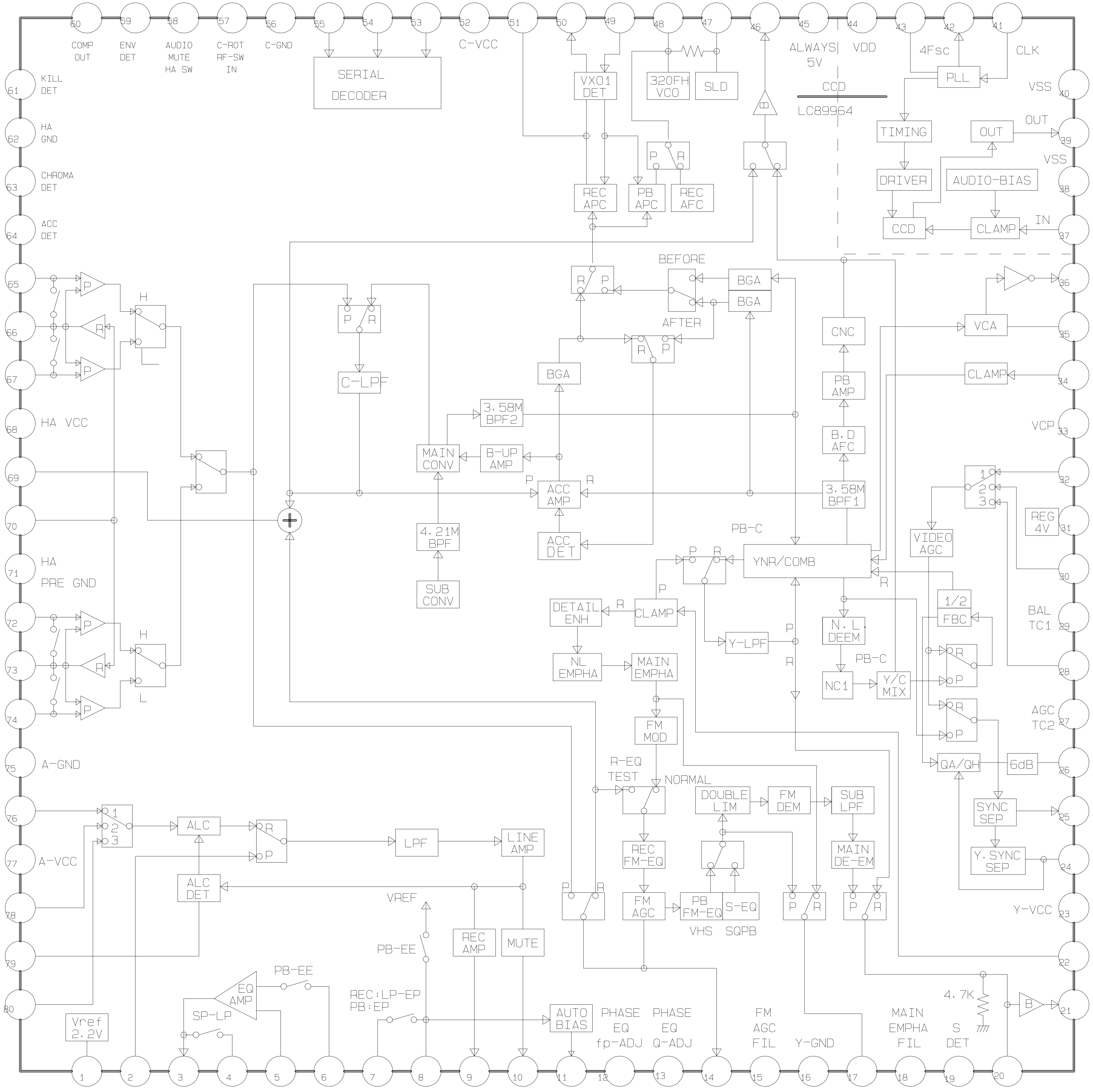
9-4 DIC1(S5L3200) A/V Codec Block Diagram


DDR SDRAM #0
DDR SDRAM #1
Dual Channel DDR Controller & AHB+ BUS
ARM9TDMI
4KB I-Cache
4KB D-Cache
AHB+ Wrapper
CalmADM #0
4KB I-Cache
12KB D-Cache
CalmADM #1
4KB I-Cache
12KB D-Cache
SDIN
BT656(IN)
Video Pre-processor
IEEE1394
IEEE1394
MPEG2 Encoder
USB 1.1 Host
USB
MPEG2 Decoder
Dual ATAPI (w/ AES)
ATAPI
DV Decoder
PSD
PIP Scaler
PSM
Graphic Accelerator
BT656(OUT)
Video Processor
MIXER
SDOUT
Video PENTA DAC
Analog Video Out
SPD
IODMA
PLL, Clock/Reset Generation Block
27MHz X-tal
APB Bridge
I2S
SPDIF(IN)
SPDIF(OUT)
SPI
UART
WDT
IR
Host I/F
TIMER
I2C
GPIO

9-5 DIC3(29DL323) Flash MEM Block Diagram


VCC
VSS
OE#
BYTE#
A20–A0
Upper Bank Address
Y-Decoder
Upper Bank
Latches and Control Logic
DQ15–DQ0
A20–A0
RY/BY#
A20–A0
X-Decoder
RESET#
WE#
CE#
BYTE#
WP#/ACC
STATE CONTROL & COMMAND REGISTER
Status
DQ15–DQ0
Control
DQ15–DQ0
X-Decoder
A20–A0
DQ15–DQ0
Y-Decoder
Lower Bank
Latches and Control Logic
A20–A0
Lower Bank Address
OE#
BYTE#

9-6 IC301(LA71207) A/V 1Chip Block Diagram


COMP OUT
ENV DET
AUDIO MUTE HA SW
C-ROT RF-SW IN
C-GND
C-VCC
SERIAL DECODER
VXO1 DET
320FH VCO
SLD
ALWAYS 5V
VDD
4Fsc
CLK
PLL
CCD
LC89964
TIMING
OUT
DRIVER
AUDIO-BIAS
CCD
CLAMP
VSS
OUT
VSS
IN
KILL DET
HA GND
CHROMA DET
ACC DET
REC APC
PB APC
REC AFC
BEFORE
BGA
BGA
AFTER
CNC
VCA
CLAMP
PB AMP
B.D AFC
3.58M BPF1
3.58M BPF2
C-LPF
BGA
MAIN CONV
B-UP AMP
ACC AMP
ACC DET
4.21M BPF
SUB CONV
HA VCC
HA PRE GND
VCP
REG 4V
VIDEO AGC
YNR/COMB
PB-C
1/2
FBC
BAL TC1
AGC TC2
DETAIL ENH
CLAMP
Y-LPF
N.L. DEEM
NL EMPHA
MAIN EMPHA
NC1
Y/C MIX
PB-C
QA/QH
6dB
FM MOD
R-EQ TEST
NORMAL
DOUBLE LIM
FM DEM
SUB LPF
SYNC SEP
Y.SYNC SEP
A-GND
A-VCC
ALC
ALC DET
LPF
LINE AMP
REC FM-EQ
MAIN DE-EM
VREF
PB-EE
REC AMP
MUTE
FM AGC
PB FM-EQ
S-EQ
VHS
SQPB
Y-VCC
4.7K
PB-EE
EQ AMP
SP-LP
REC:LP-EP
PB:EP
AUTO BIAS
PHASE EQ fp-ADJ
PHASE EQ Q-ADJ
FM AGC FIL
Y-GND
MAIN EMPHA FIL
S DET
Vref 2.2V
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
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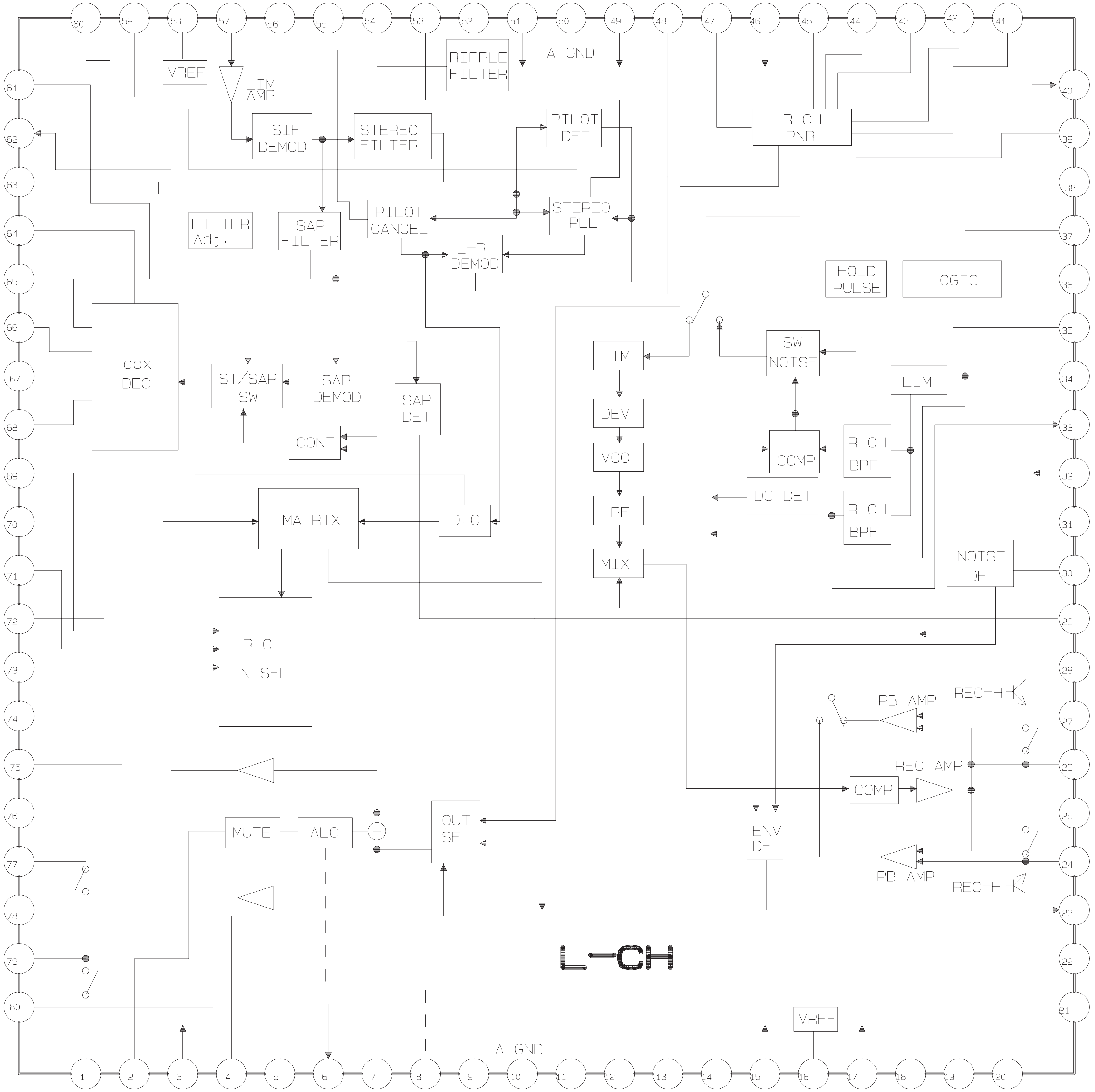
9-7 IC501(LA71607M) Hi-Fi Block Diagram


VREF
LIM AMP
SIF DEMOD
STEREO FILTER
RIPPLE FILTER
A GND
PILOT DET
R-CH PNR
FILTER Adj.
SAP FILTER
PILOT CANCEL
STEREO PLL
L-R DEMOD
HOLD PULSE
LOGIC
dbx DEC
ST/SAP SW
SAP DEMOD
SAP DET
CONT
LIM
SW NOISE
LIM
DEV
VCO
COMP
R-CH BPF
DO DET
R-CH BPF
LPF
MIX
MATRIX
D.C
NOISE DET
R-CH IN SEL
PB AMP
REC-H
REC AMP
COMP
PB AMP
REC-H
ENV DET
MUTE
ALC
OUT SEL
L-CH
VREF
A GND
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
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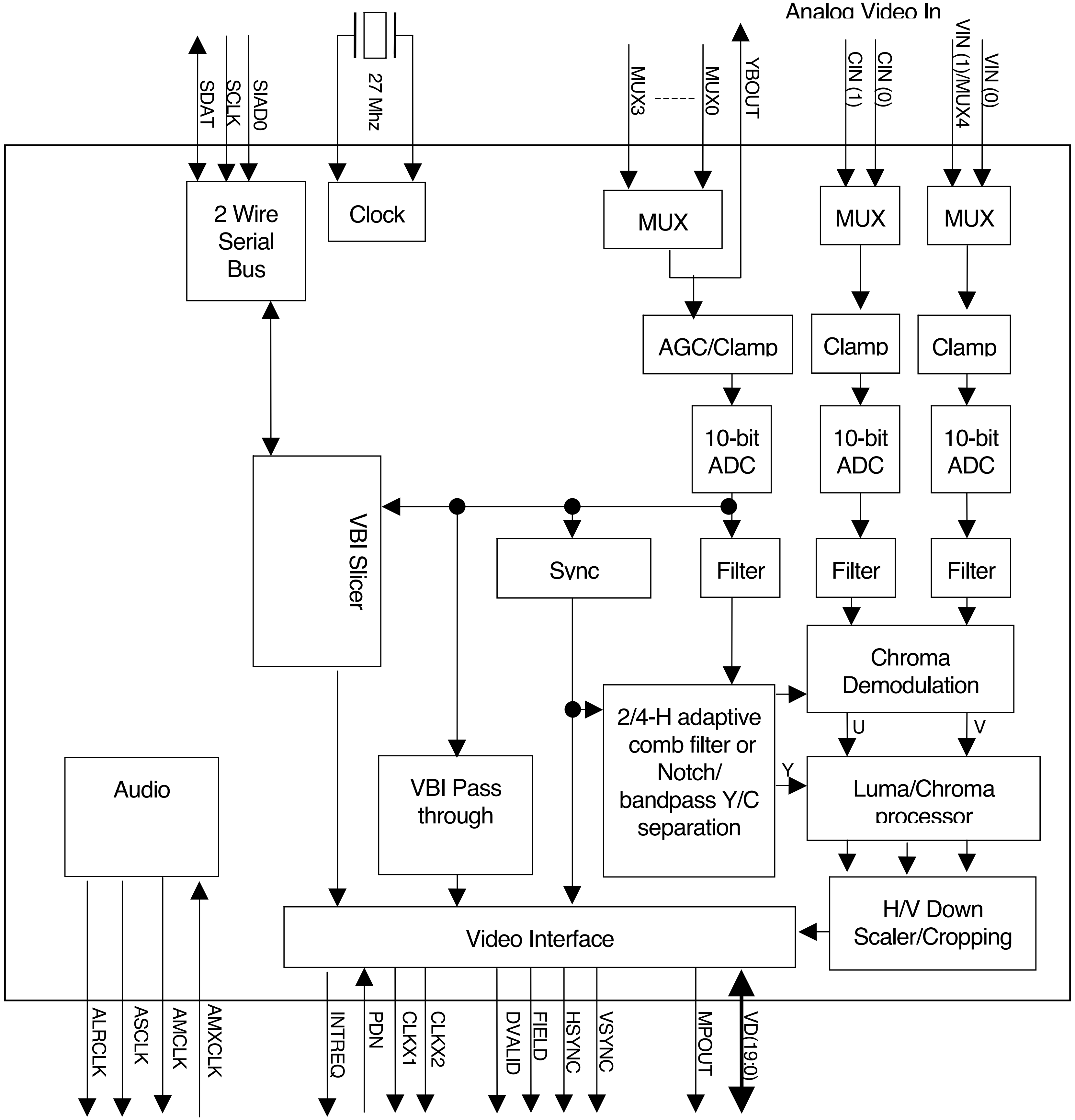
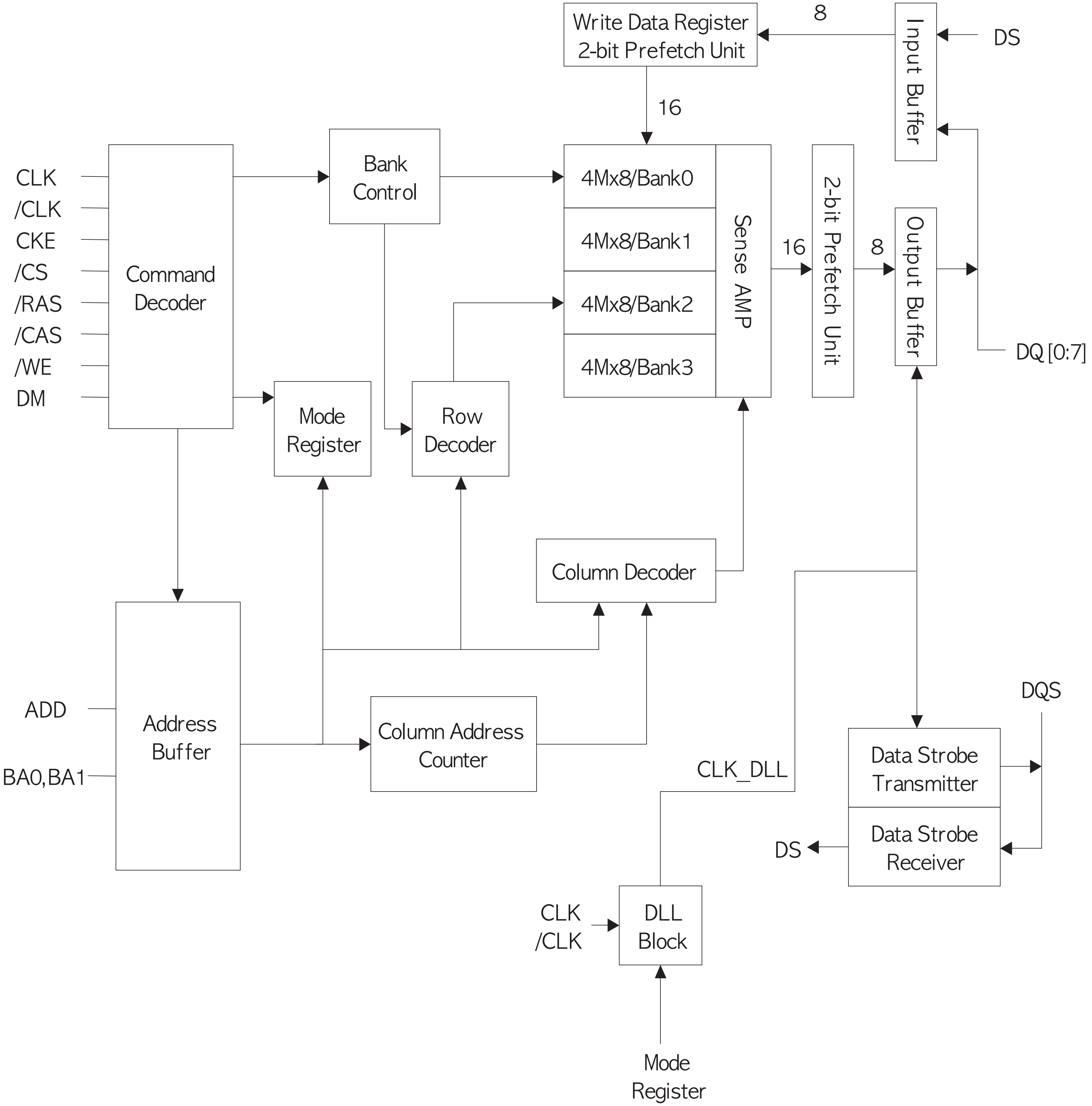
9-8 TIC1(TW9906) Video Decoder Block Diagram

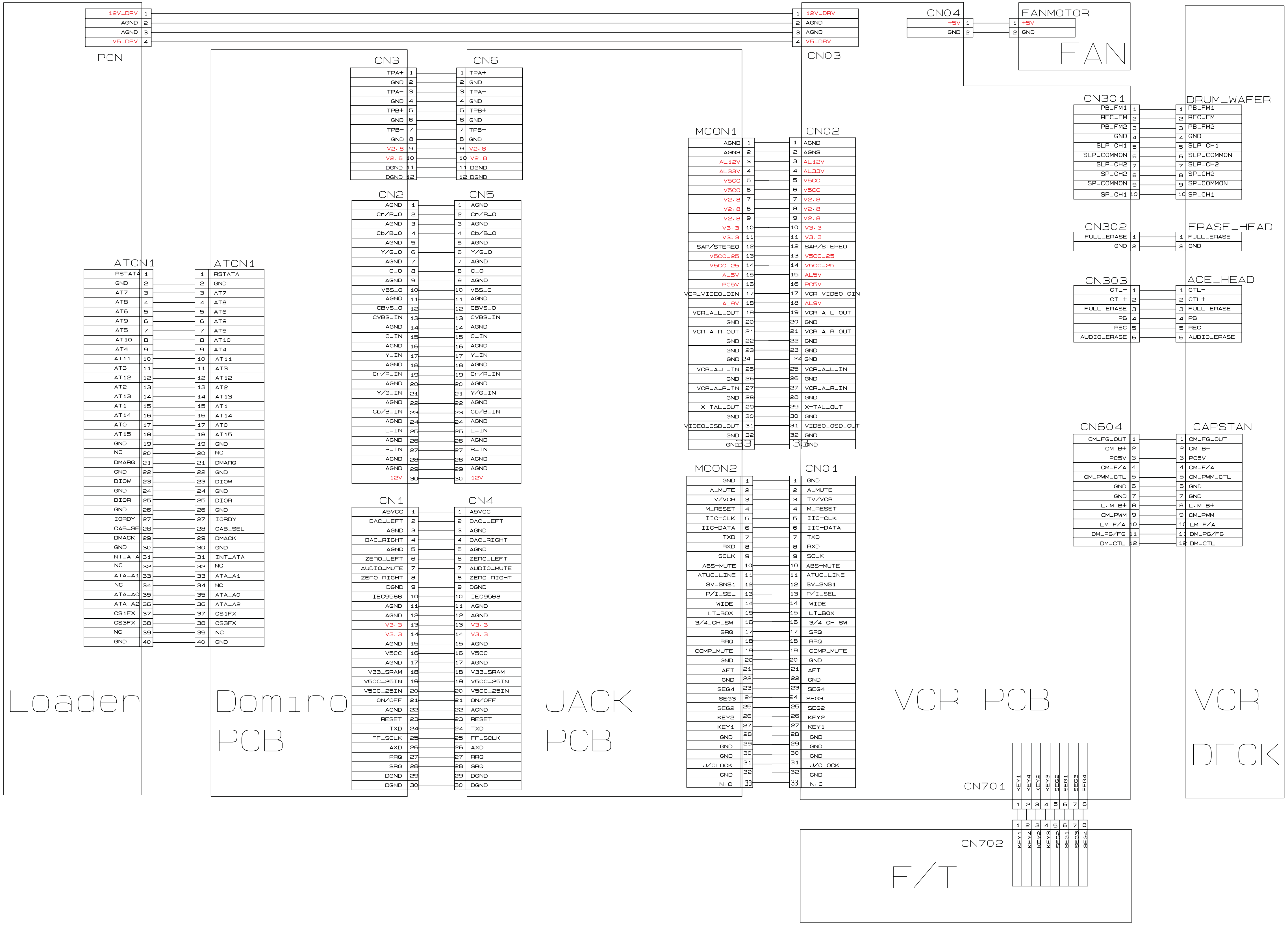

Analog Video In
SDAT
SCLK
SIAD0
27 Mhz
MUX3

MUX0
YBOUT
CIN (1)
CIN (0)
VIN (1)/MUX4
VIN (0)
2 Wire Serial Bus
Clock
MUX
MUX
MUX
AGC/Clamp
Clamp
Clamp
10-bit ADC
10-bit ADC
10-bit ADC
VBI Slicer
Sync
Filter
Filter
Filter
Chroma Demodulation
U
V
2/4-H adaptive comb filter or Notch/ bandpass Y/C separation
Y
Luma/Chroma processor
Audio
VBI Pass through
H/V Down Scaler/Cropping
Video Interface
ALRCLK
ASCLK
AMCLK
AMXCLK
INTREQ
PDN
CLKX1
CLKX2
DVALID
FIELD
HSYNC
VSYNC
MPOUT
VD(19:0)

9-9 U3,U4 (HY5DU281622ETP-J) Dram Block Diagram


Write Data Register
2-bit Prefetch Unit
8
Input Buffer
DS
16
Bank
Control
CLK
/CLK
CKE
/CS
/RAS
/CAS
/WE
DM
Command
Decoder
4Mx8/Bank0
4Mx8/Bank1
4Mx8/Bank2
4Mx8/Bank3
Sense AMP
16
2-bit Prefetch Unit
8
Output Buffer
DQ [0:7]
Mode
Register
Row
Decoder
Column Decoder
ADD
BA0,BA1
Address
Buffer
Column Address
Counter
CLK_DLL
DQS
Data Strobe
Transmitter
Data Strobe
Receiver
DS
CLK
/CLK
DLL
Block
Mode
Register

10. Wiring Diagram


Loader
Domino PCB
JACK PCB
VCR PCB
VCR DECK
F/T
FAN
PCN / CN03
12V_DRV
AGND
AGND
V5_DRV
CN04 / FANMOTOR
+5V
GND
CN3 / CN6
TPA+
GND
TPA-
GND
TPB+
GND
TPB-
GND
V2.8
V2.8
DGND
DGND
CN2 / CN5
AGND
Cr/R_O
AGND
Cb/B_O
AGND
Y/G_O
AGND
C_O
AGND
VBS_O
AGND
CBVS_O
CVBS_IN
AGND
C_IN
AGND
Y_IN
AGND
Cr/R_IN
AGND
Y/G_IN
AGND
Cb/B_IN
AGND
L_IN
AGND
R_IN
AGND
AGND
12V
CN1 / CN4
A5VCC
DAC_LEFT
AGND
DAC_RIGHT
AGND
ZERO_LEFT
AUDIO_MUTE
ZERO_RIGHT
DGND
IEC9568
AGND
AGND
V3.3
V3.3
AGND
V5CC
AGND
V33_SRAM
V5CC_25IN
V5CC_25IN
ON/OFF
AGND
RESET
TXD
FF_SCLK
AXD
RRQ
SRQ
DGND
DGND
ATCN1 / ATCN1
RSTATA
GND
AT7
AT8
AT6
AT9
AT5
AT10
AT4
AT11
AT3
AT12
AT2
AT13
AT1
AT14
AT0
AT15
GND
NC
DMARQ
GND
DIOW
GND
DIOR
GND
IORDY
CAB_SEL
DMACK
GND
NT_ATA
INT_ATA
NC
ATA_A1
NC
ATA_A0
ATA_A2
CS1FX
CS3FX
NC
GND
MCON1 / CN02
AGND
AGNS
AL12V
AL33V
V5CC
V5CC
V2.8
V2.8
V2.8
V3.3
V3.3
SAP/STEREO
V5CC_25
V5CC_25
AL5V
PC5V
VCR_VIDEO_OIN
AL9V
VCR_A_L_OUT
GND
VCR_A_R_OUT
GND
GND
GND
VCR_A_L_IN
GND
VCR_A_R_IN
GND
X-TAL_OUT
GND
VIDEO_OSD_OUT
GND
GND
MCON2 / CN01
GND
A_MUTE
TV/VCR
M_RESET
IIC-CLK
IIC-DATA
TXD
RXD
SCLK
ABS-MUTE
ATUO_LINE
SV_SNS1
P/I_SEL
WIDE
LT_BOX
3/4_CH_SW
SRQ
RRQ
COMP_MUTE
GND
AFT
GND
SEG4
SEG3
SEG2
KEY2
KEY1
GND
GND
GND
J/CLOCK
GND
N.C
CN301 / DRUM_WAFER
PB_FM1
REC_FM
PB_FM2
GND
SLP_CH1
SLP_COMMON
SLP_CH2
SP_CH2
SP_COMMON
SP_CH1
CN302 / ERASE_HEAD
FULL_ERASE
GND
CN303 / ACE_HEAD
CTL-
CTL+
FULL_ERASE
PB
REC
AUDIO_ERASE
CN604 / CAPSTAN
CM_FG_OUT
CM_B+
PC5V
CM_F/A
CM_PWM_CTL
GND
GND
L.M_B+
CM_PWM
LM_F/A
DM_PG/FG
DM_CTL
CN701 / CN702
KEY1
KEY4
KEY2
KEY3
SEG2
SEG1
SEG3
SEG4

MEMO

11. PCB Diagrams

11-1 VCR Main PCB - 11-2

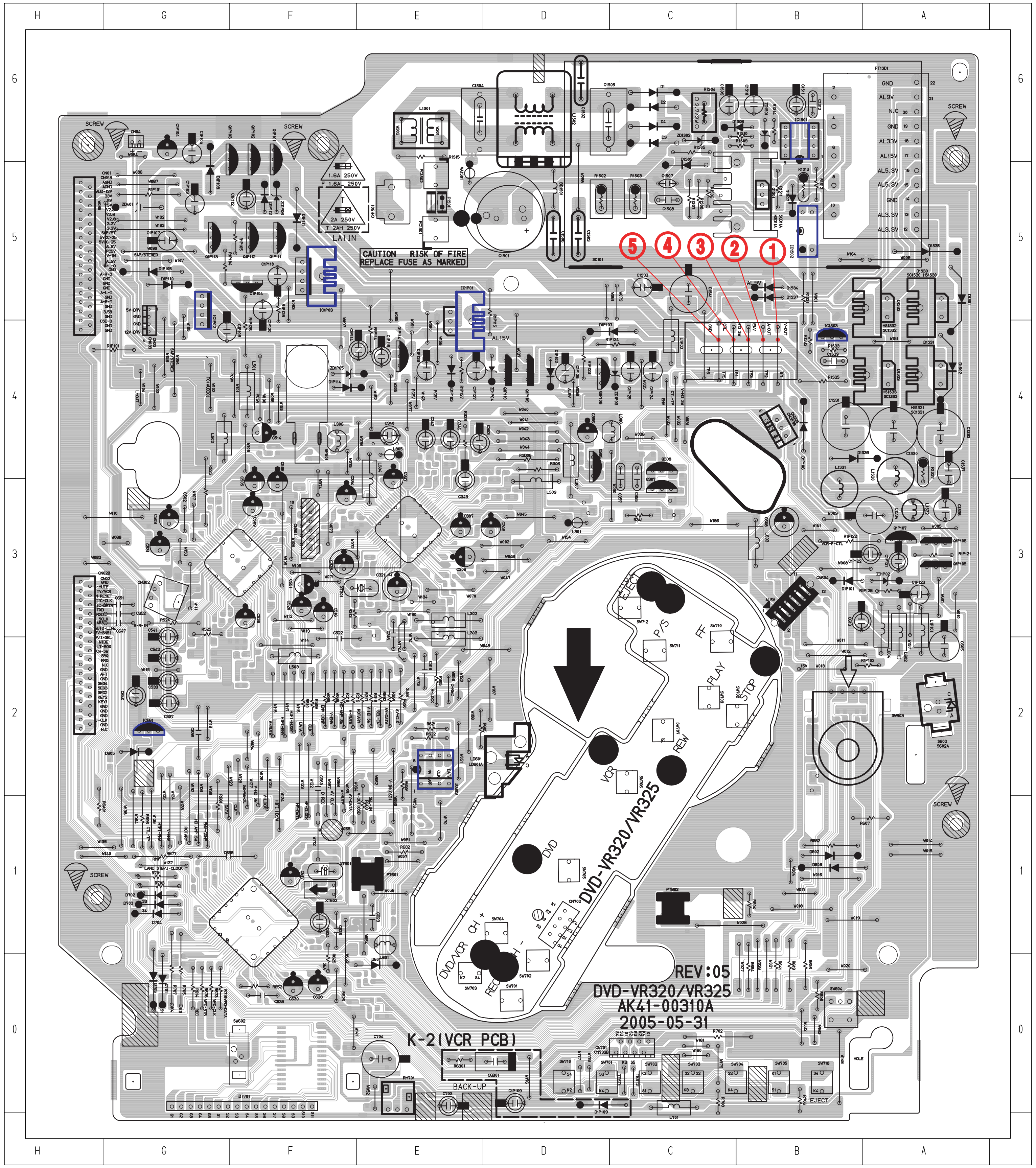
11-2 DVD Main PCB - 11-4

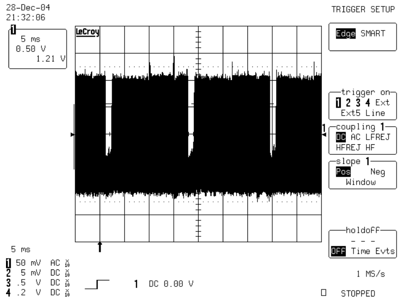
11-3 Jack PCB - 11-6

11-4 Function PCB - 11-8

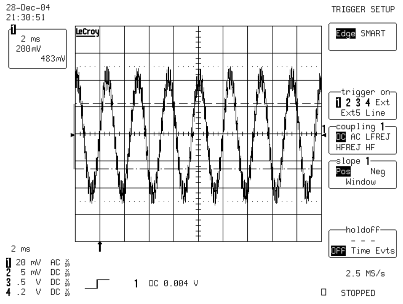
11-1 VCR Main PCB

COMPONENT SIDE

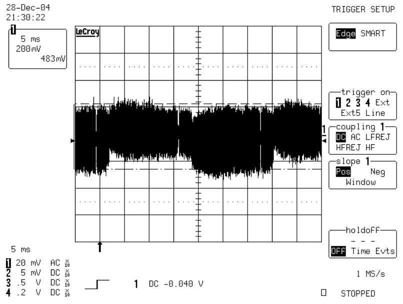

H
G
F
E
D
C
B
A
6
5
4
3
2
1
0
CAUTION RISK OF FIRE
REPLACE FUSE AS MARKED
LATIN
SCREW
①
②
③
④
⑤
EJECT
P/S
FF
PLAY
STOP
REW
VCR
DVD
DVD/VCR
CH +
CH -
REC
DVD-VR320/VR325
REV:05
DVD-VR320/VR325
AK41-00310A
2005-05-31
K-2(VCR PCB)
BACK-UP
HOLE



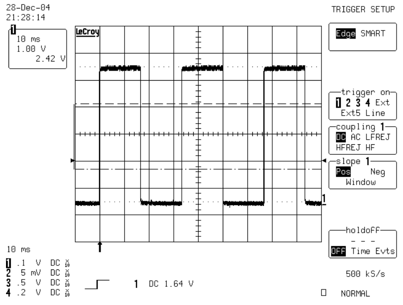
❶ V_OUT



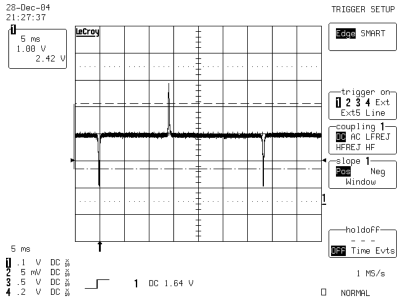
❷ A_OUT



❸ ENV

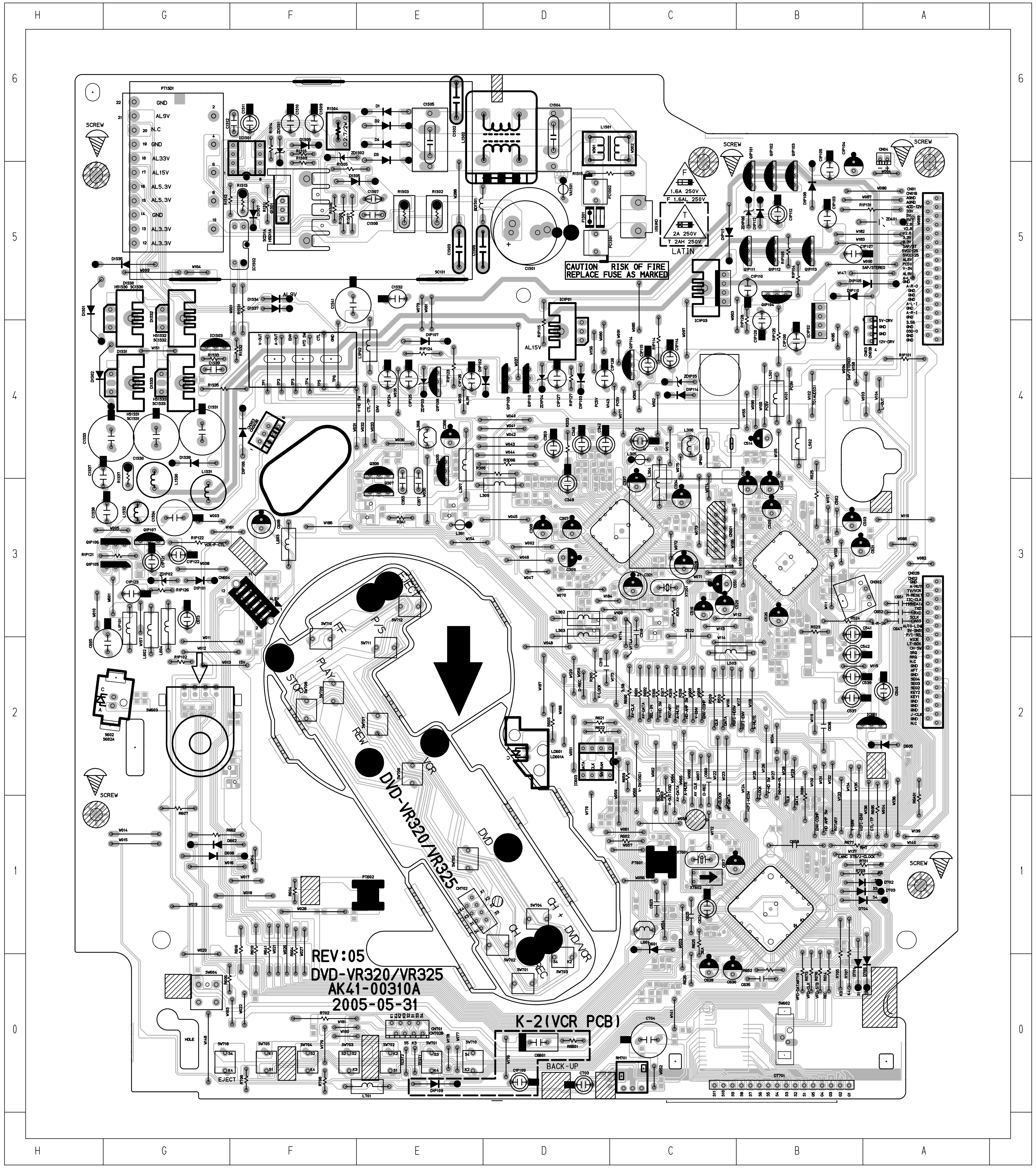


❹ HD SW



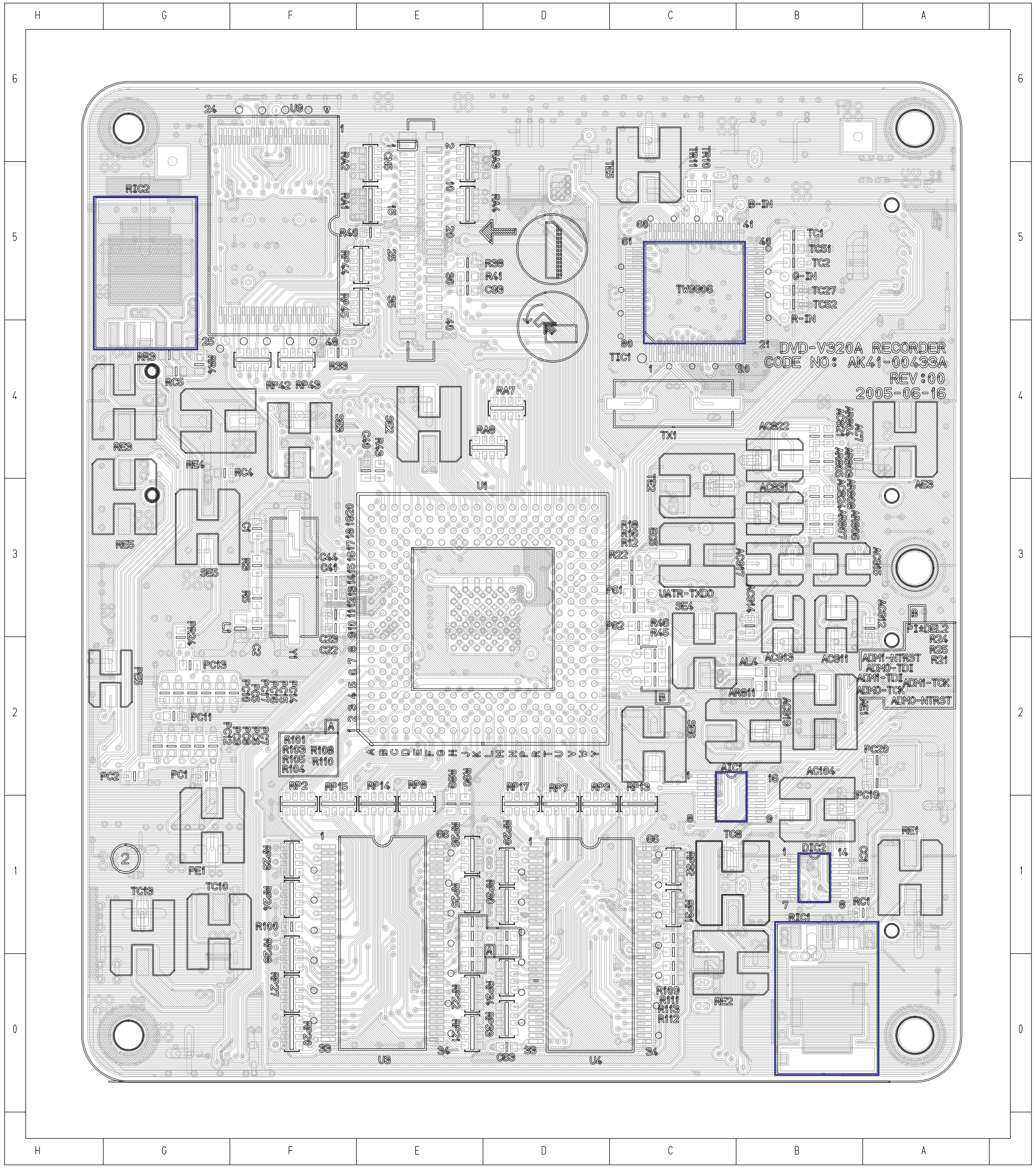
❺ CTL

CONDUCTOR SIDE

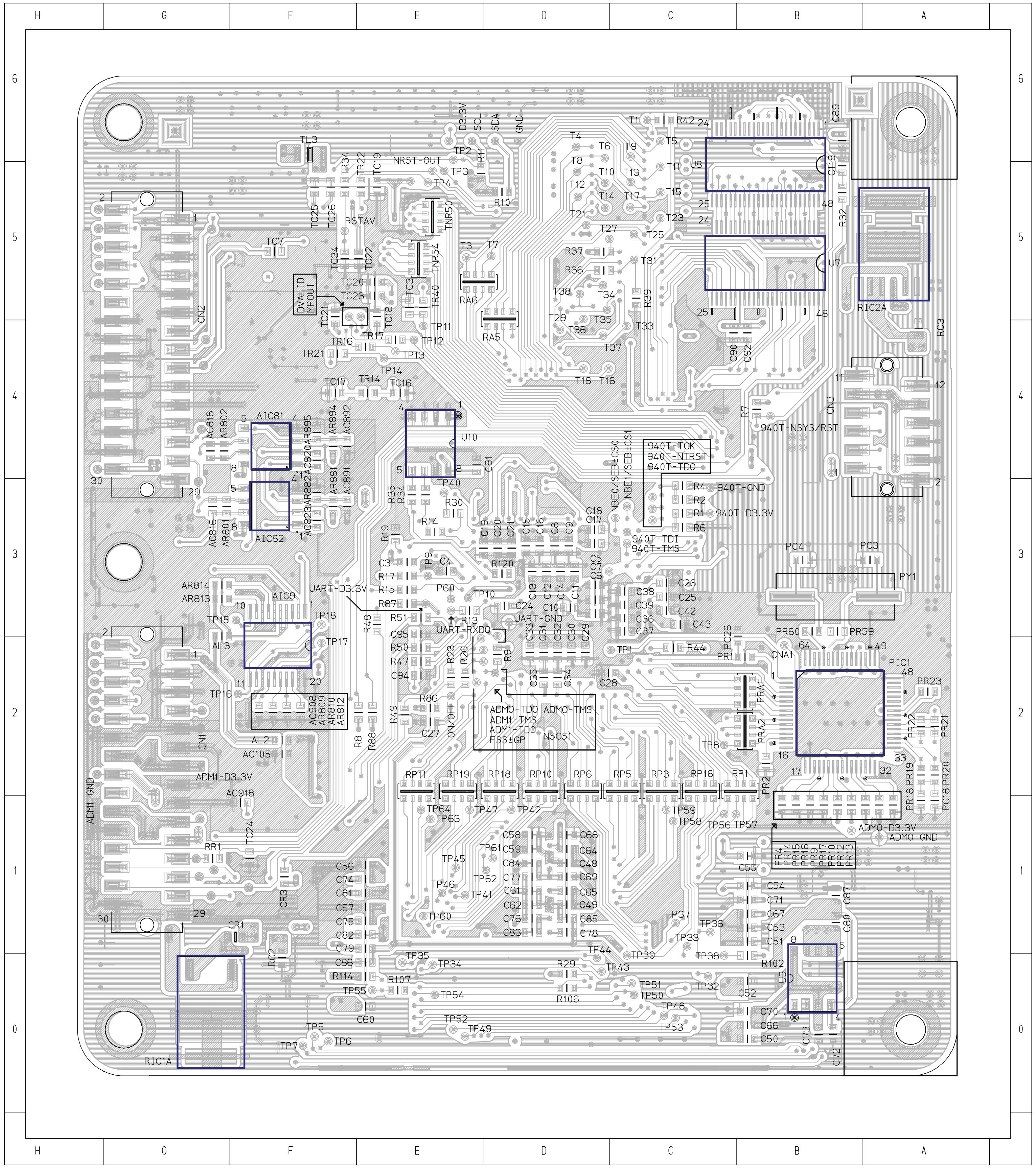

H
G
F
E
D
C
B
A
6
5
4
3
2
1
0
SCREW
CAUTION RISK OF FIRE
REPLACE FUSE AS MARKED
LATIN
REV:05
DVD-VR320/VR325
AK41-00310A
2005-05-31
K-2(VCR PCB)
DVD-VR320/VR325
STOP
PLAY
FF
REW
DVD
EJECT
BACK-UP
HOLE

11-2 DVD Main PCB

COMPONENT SIDE

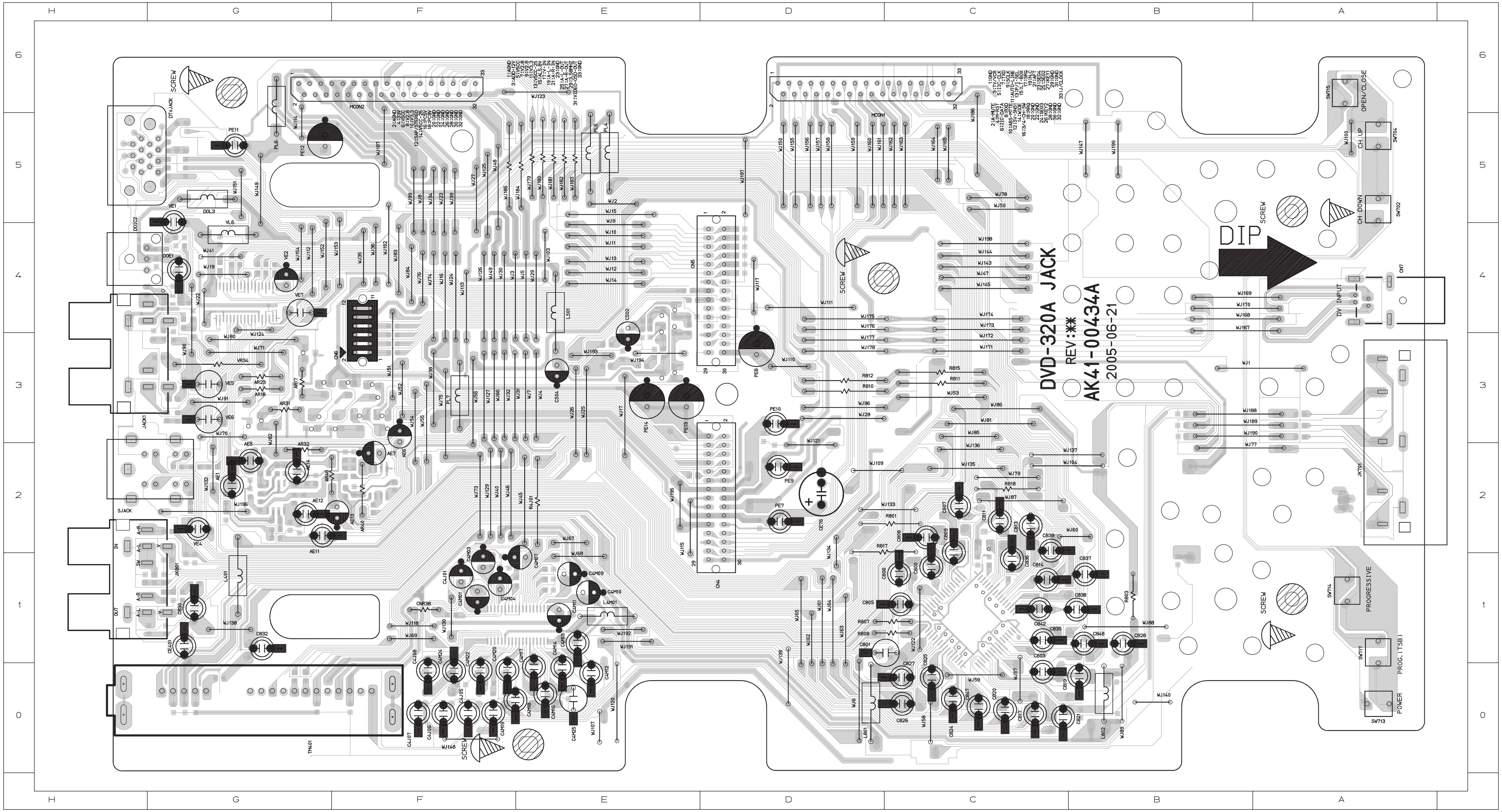

H
G
F
E
D
C
B
A
6
5
4
3
2
1
0
DVD-V320A RECORDER
CODE NO: AK41-00433A
REV:00
2005-06-16
U9
RIC2
TW9906
B-IN
G-IN
R-IN
TC1
TCS1
TC2
TC27
TCS2
TIC1
TX1
TR10
TR11
TE5
RA2
RA1
RA5
RA6
RA7
RA8
R40
R38
R41
C53
RR3
RC5
RP42
RP43
R33
RE3
RE4
RC4
RE5
SE5
SE2
SE3
U1
Y1
C44
C41
C23
C22
PE5
PC13
PC11
PC2
PC1
R101
R103
R105
R104
R108
R110
RP2
RP15
RP14
RP8
RP17
RP7
RP9
RP13
PE1
TC19
TC18
U3
U4
RP25
RP24
RP26
RP27
RP28
R100
C63
R109
R111
R113
R112
RE2
RIC1
DIC2
RC1
RE1
AIC1
TC8
AC104
PC19
PC20
ACS22
ACS21
AE3
ACS16
ACS12
ACS13
ACS11
AL4
ARS11
ACS10
UATR-TXD0
SE4
R22
PC1
PC2
R46
R45
PI4DEL2
R24
R25
R21
ADM1-NTRST
ADM0-TDI
ADM1-TDI
ADM1-TCK
ADM0-TCK
ADM0-NTRST

CONDUCTOR SIDE

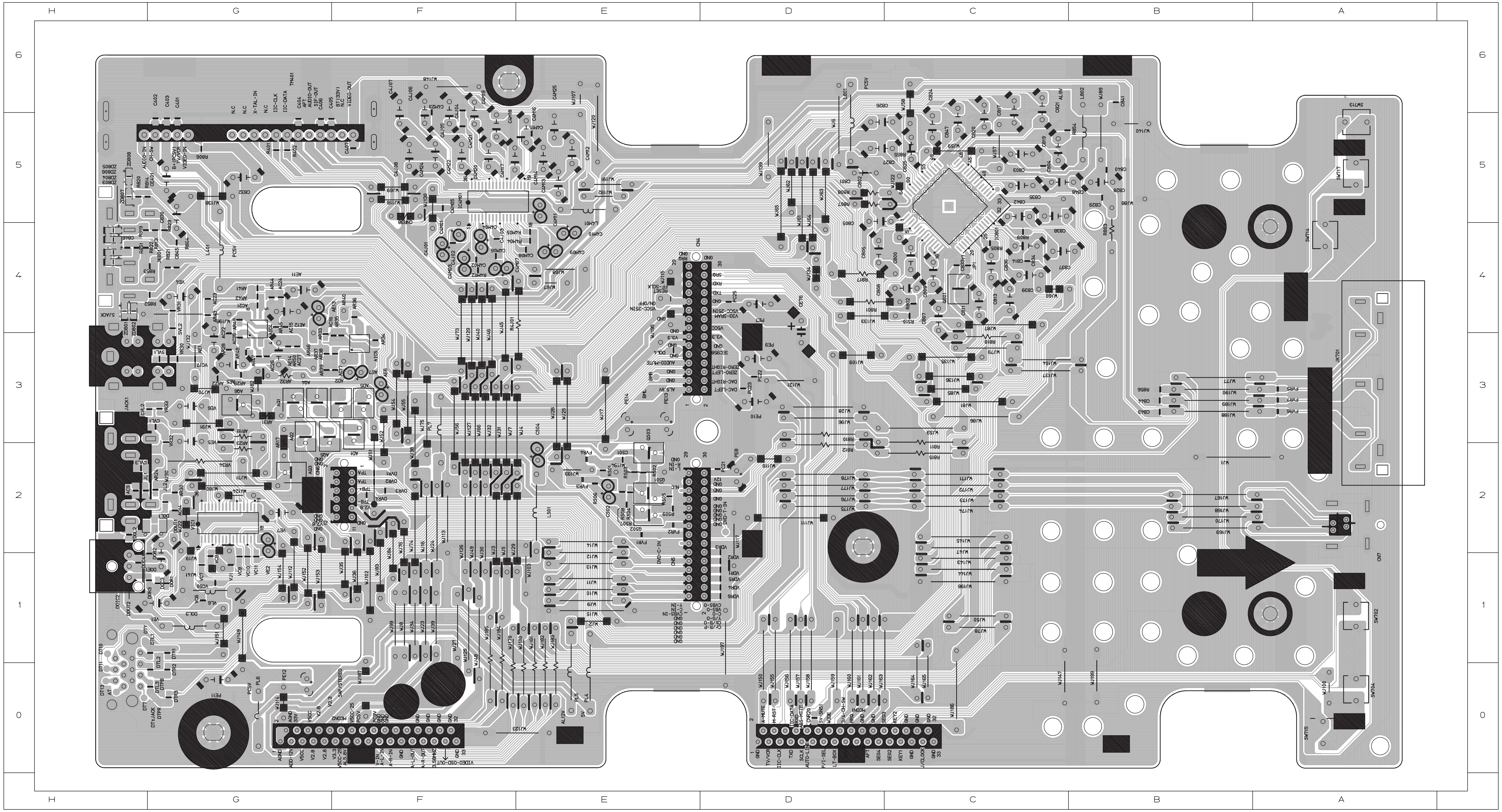

H
G
F
E
D
C
B
A
6
5
4
3
2
1
0
CN2
CN1
CN3
CNA1
U5
U7
U8
U10
AIC81
AIC82
AIC9
PIC1
RIC1A
RIC2A
PY1
AL2
AL3
CR1
CR3
RC2
RC3
RR1
TL3
D3.3V
SCL
SDA
GND
NRST-OUT
RSTAV
DVALID
MPOUT
UART-D3.3V
UART-GND
UART-RXDQ
940T-TCK
940T-NTRST
940T-TDO
940T-NSYS/RST
940T-GND
940T-D3.3V
940T-TDI
940T-TMS
NBE0/SEB-CS0
NBE1/SEB-CS1
ADM0-TDO
ADM0-TMS
ADM1-TMS
ADM1-TDO
FSS-GP
NSCS1
ADM1-D3.3V
ADM1-GND
ADM0-D3.3V
ADM0-GND
ON/OFF
RP11
RP19
RP18
RP10
RP6
RP5
RP3
RP16
RP1
RA5
RA6
PRA1
PRA2
PC3
PC4
PR59
PR60
PR23
PR21
PR22
PR18
PR19
PR20
PC18
R42
R32
R37
R36
R39
R7
R44
R4
R2
R1
R6
R30
R14
R19
R120
R13
R9
R23
R26
R17
R15
R87
R51
R50
R47
R48
R49
R86
R8
R88
R10
R11
R35
R34
R29
R102
R106
R107
R114
C89
C119
C90
C92
C91
C19
C20
C21
C15
C16
C8
C9
C18
C17
C5
C7
C6
C26
C25
C42
C43
C38
C39
C36
C37
C13
C12
C14
C11
C24
C10
C33
C31
C32
C30
C29
C35
C34
C28
C3
C4
C95
C94
C27
C58
C59
C84
C77
C61
C62
C76
C83
C68
C64
C48
C69
C65
C49
C85
C78
C56
C74
C81
C57
C75
C82
C79
C86
C55
C54
C71
C67
C53
C51
C52
C87
C80
C70
C66
C50
C73
C72
C60
TP1
TP2
TP3
TP4
TP5
TP6
TP7
TP8
TP9
TP10
TP11
TP12
TP13
TP14
TP15
TP16
TP17
TP18
TP40
TP60
TP64
TP63
TP47
TP42
TP59
TP58
TP56
TP57
TP45
TP61
TP46
TP62
TP41
TP37
TP36
TP33
TP38
TP35
TP34
TP44
TP39
TP43
TP54
TP55
TP51
TP50
TP48
TP53
TP32
TP52
TP49
TC7
TC25
TC26
TC34
TC22
TC19
TC20
TC23
TC21
TC18
TC3
TC17
TC16
TC24
TR34
TR22
TR40
TR16
TR17
TR21
TR14
TNR50
TNR54
AC818
AR802
AR894
AC892
AR801
AC816
AR881
AC891
AR814
AR813
AC908
AR809
AR810
AR812
AC105
AC918
T1
T3
T4
T5
T6
T7
T8
T9
T10
T11
T12
T13
T14
T15
T16
T17
T18
T21
T23
T25
T27
T29
T31
T33
T34
T35
T36
T37
T38

11-3 Jack PCB

COMPONENT SIDE

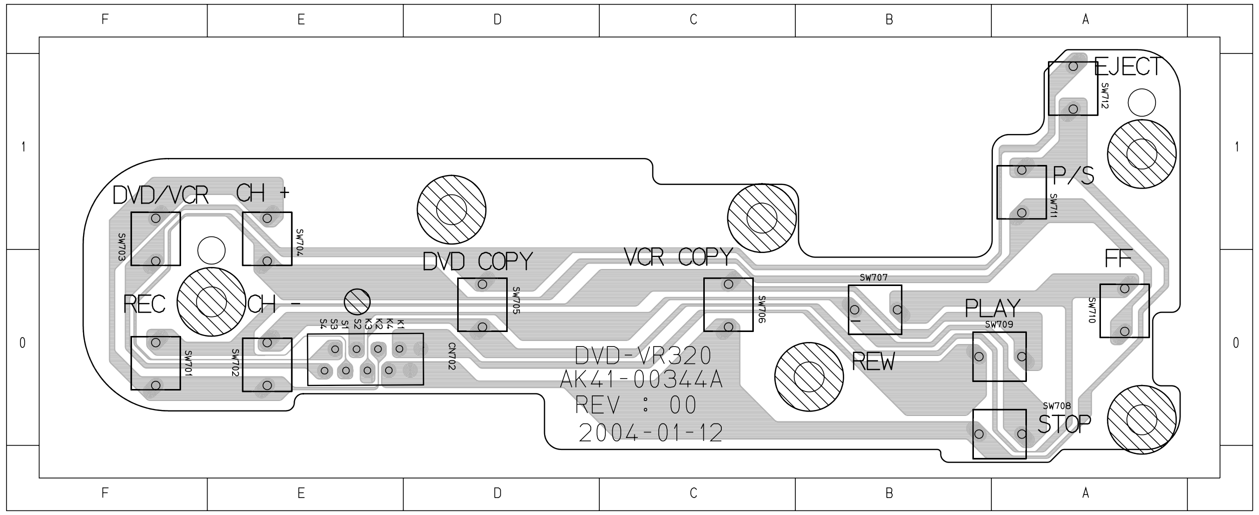

H
G
F
E
D
C
B
A
6
5
4
3
2
1
0
DVD-320A JACK
REV:**
AK41-00434A
2005-06-21
DIP
SCREW
MCON2
MCON1
CN5
CN4
CN6
CN7
JACK1
JK801
JK701
TM401
OPEN/CLOSE
CH UP
CH DOWN
DV INPUT
PROGRESSIVE
PROG.(TSB)
POWER
SW715
SW704
SW702
SW714
SW717
SW713

CONDUCTOR SIDE

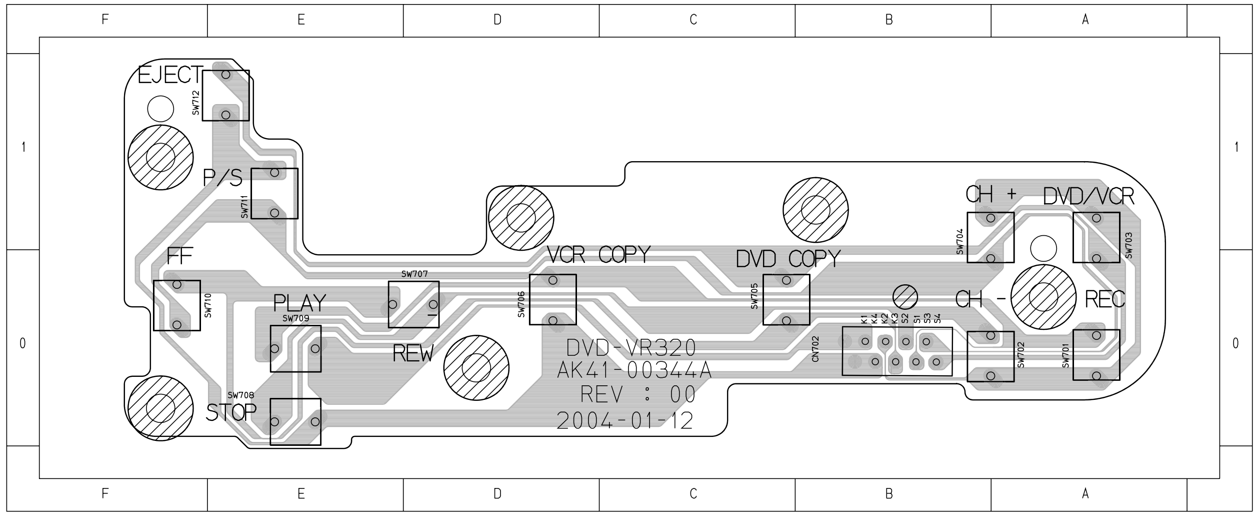

H
G
F
E
D
C
B
A
6
5
4
3
2
1
0

11-4 Function PCB

COMPONENT SIDE


F
E
D
C
B
A
1
0
EJECT
SW712
P/S
SW711
DVD/VCR
CH +
SW703
SW704
DVD COPY
VCR COPY
FF
SW705
SW706
SW707
SW710
REC
CH -
PLAY
SW709
SW701
SW702
CN702
REW
STOP
SW708
DVD-VR320
AK41-00344A
REV : 00
2004-01-12

CONDUCTOR SIDE


F
E
D
C
B
A
1
0
EJECT
SW712
P/S
SW711
CH +
DVD/VCR
SW704
SW703
FF
VCR COPY
DVD COPY
SW707
SW706
SW705
SW710
PLAY
SW709
REW
CH -
REC
CN702
SW702
SW701
STOP
SW708
DVD-VR320
AK41-00344A
REV : 00
2004-01-12

12. Schematic Diagrams

◆ Block Identification of Main PCB - - - - - 12-2

12-1 S.M.P.S (VCR Main PCB) - - - - - 12-3

12-2 Power (VCR Main PCB) - - - - - 12-4

12-3 Logic (VCR Main PCB) - - - - - 12-5

12-4 A/V (VCR Main PCB) - - - - - 12-6

12-5 Hi-Fi (VCR Main PCB) - - - - - 12-7

12-6 IEEE 1394 (DVD Main PCB) - - - - - 12-8

12-7 Video Decoder (DVD Main PCB) - - - - - 12-9

12-8 Connector (DVD Main PCB) - - - - - 12-10

12-9 Audio In/Out (DVD Main PCB) - - - - - 12-11

12-10 DDR (DVD Main PCB) - - - - - 12-12

12-11 Nor Flash (DVD Main PCB) - - - - - 12-13

12-12 Power (DVD Main PCB) - - - - - 12-14

12-13 Atapi (DVD Main PCB) - - - - - 12-15

12-14 UART_IR_HOST (DVD Main PCB) - - - - - 12-16

12-15 S5L3200 Memory (DVD Main PCB) - - - - - 12-17

12-16 MUX & TM & A/V Input (Jack PCB) - - - - - 12-18

12-17 A/V Out (Jack PCB) - - - - - 12-19

Note

For schematic Diagram
- Resistors are in ohms, 1/8W unless otherwise noted.

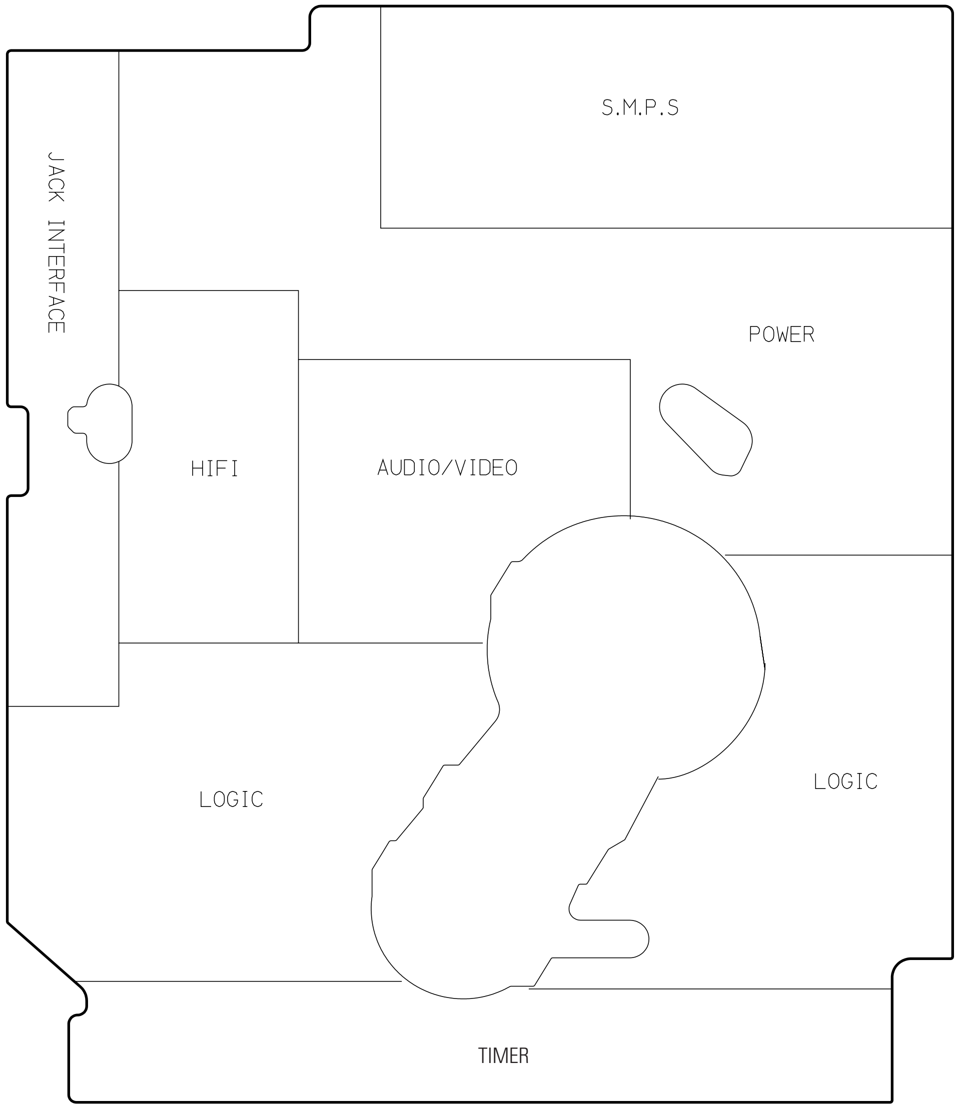
Special note :
Most semiconductor devices are electrostatically sensitive and therefore require the special handling techniques described under the "electrostatically sensitive (ES) devices" section of this service manual.

Note :
Do not use the part number shown on this drawing for ordering. The correct part number is shown in the parts list (may be slightly different or amended since this drawing was prepared).

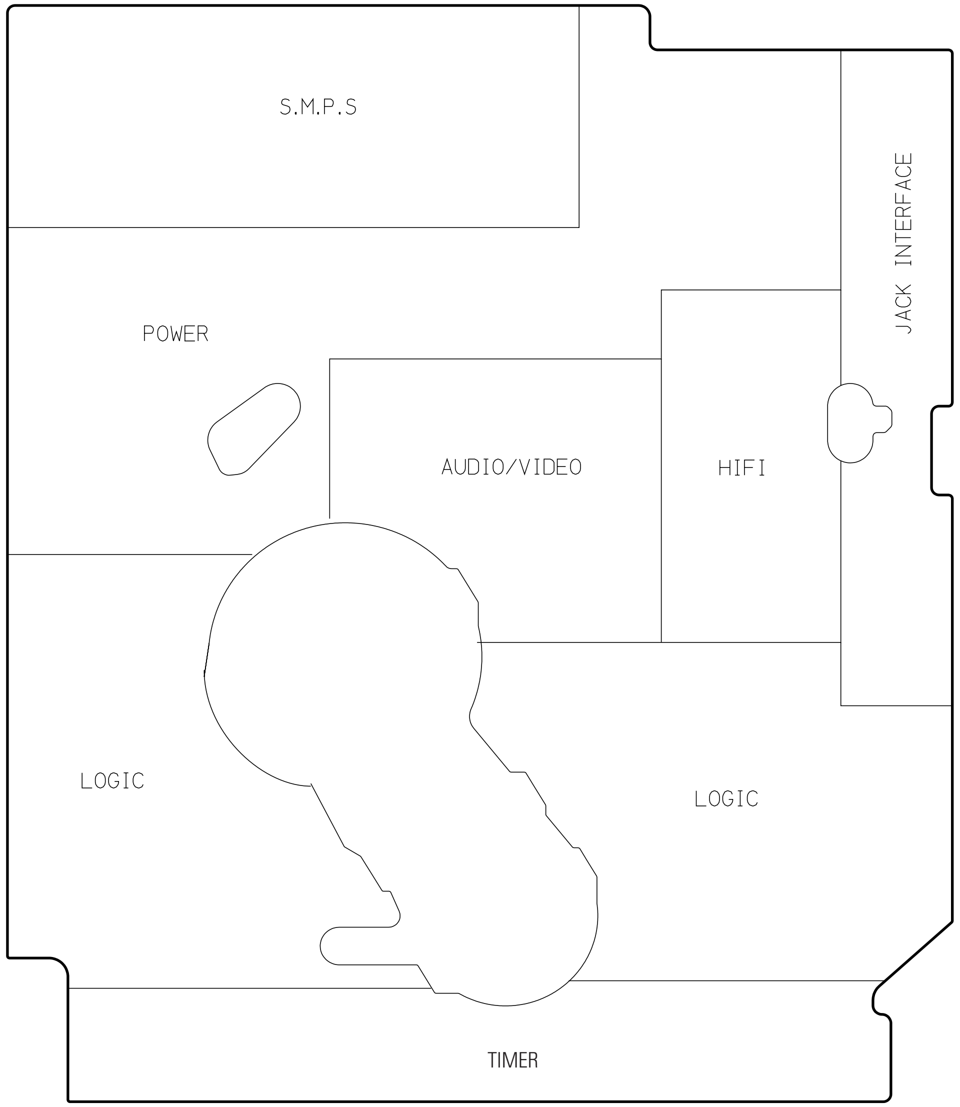
Important safety notices :
Components identified with the mark ⚠ have the special characteristics for safety. When replacing any of these components.
Use only the same type.

◆ Block Identification of Main PCB

VCR MAIN PCB

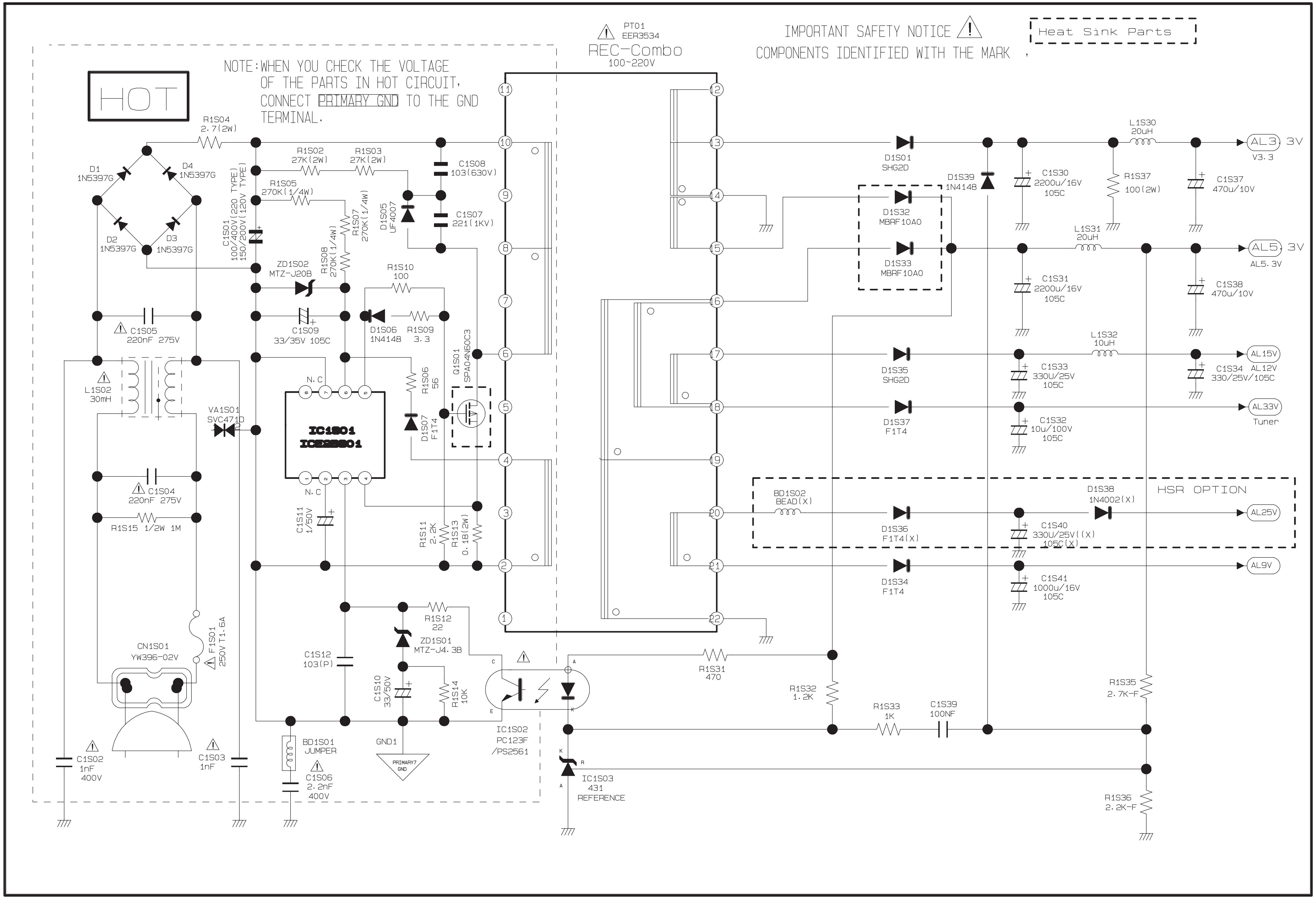

S.M.P.S
JACK INTERFACE
POWER
HIFI
AUDIO/VIDEO
LOGIC
LOGIC
TIMER

<Component Side>


S.M.P.S
JACK INTERFACE
POWER
AUDIO/VIDEO
HIFI
LOGIC
LOGIC
TIMER

<Conductor Side>

12-1 S.M.P.S (VCR Main PCB)


HOT
NOTE:WHEN YOU CHECK THE VOLTAGE
OF THE PARTS IN HOT CIRCUIT,
CONNECT PRIMARY GND TO THE GND
TERMINAL.
PT01
EER3534
REC-Combo
100~220V
IMPORTANT SAFETY NOTICE
COMPONENTS IDENTIFIED WITH THE MARK
Heat Sink Parts
R1S04
2.7(2W)
D1
1N5397G
D4
1N5397G
D2
1N5397G
D3
1N5397G
C1S01
100/400V(220 TYPE)
150/200V(120V TYPE)
R1S02
27K(2W)
R1S03
27K(2W)
R1S05
270K(1/4W)
R1S07
270K(1/4W)
R1S08
270K(1/4W)
D1S05
UF4007
C1S08
103(630V)
C1S07
221(1KV)
ZD1S02
MTZ-J20B
R1S10
100
C1S09
33/35V 105C
D1S06
1N4148
R1S09
3.3
C1S05
220nF 275V
L1S02
30mH
VA1S01
SVC471D
N.C
IC1S01
R1S06
56
D1S07
F1T4
Q1S01
SPA04N60C3
C1S04
220nF 275V
R1S15 1/2W 1M
C1S11
1/50V
R1S11
2.2K
R1S13
0.18(2W)
F1S01
250V T1.6A
CN1S01
YW396-02V
C1S12
103(P)
R1S12
22
ZD1S01
MTZ-J4.3B
C1S10
33/50V
R1S14
10K
C1S02
1nF
400V
C1S03
1nF
BD1S01
JUMPER
GND1
PRIMARY GND
C1S06
2.2nF
400V
IC1S02
PC123F
/PS2561
D1S01
SHG2D
D1S39
1N4148
D1S32
MBRF10A0
D1S33
MBRF10A0
L1S30
20uH
C1S30
2200u/16V
105C
R1S37
100(2W)
C1S37
470u/10V
AL3.3V
V3.3
L1S31
20uH
C1S31
2200u/16V
105C
C1S38
470u/10V
AL5.3V
D1S35
SHG2D
L1S32
10uH
C1S33
330U/25V
105C
C1S34 AL12V
330/25V/105C
AL15V
D1S37
F1T4
C1S32
10u/100V
105C
AL33V
Tuner
BD1S02
BEAD(X)
D1S38
1N4002(X)
HSR OPTION
D1S36
F1T4(X)
C1S40
330U/25V((X)
105C(X)
AL25V
D1S34
F1T4
C1S41
1000u/16V
105C
AL9V
R1S31
470
R1S32
1.2K
R1S33
1K
C1S39
100NF
R1S35
2.7K-F
IC1S03
431
REFERENCE
R1S36
2.2K-F

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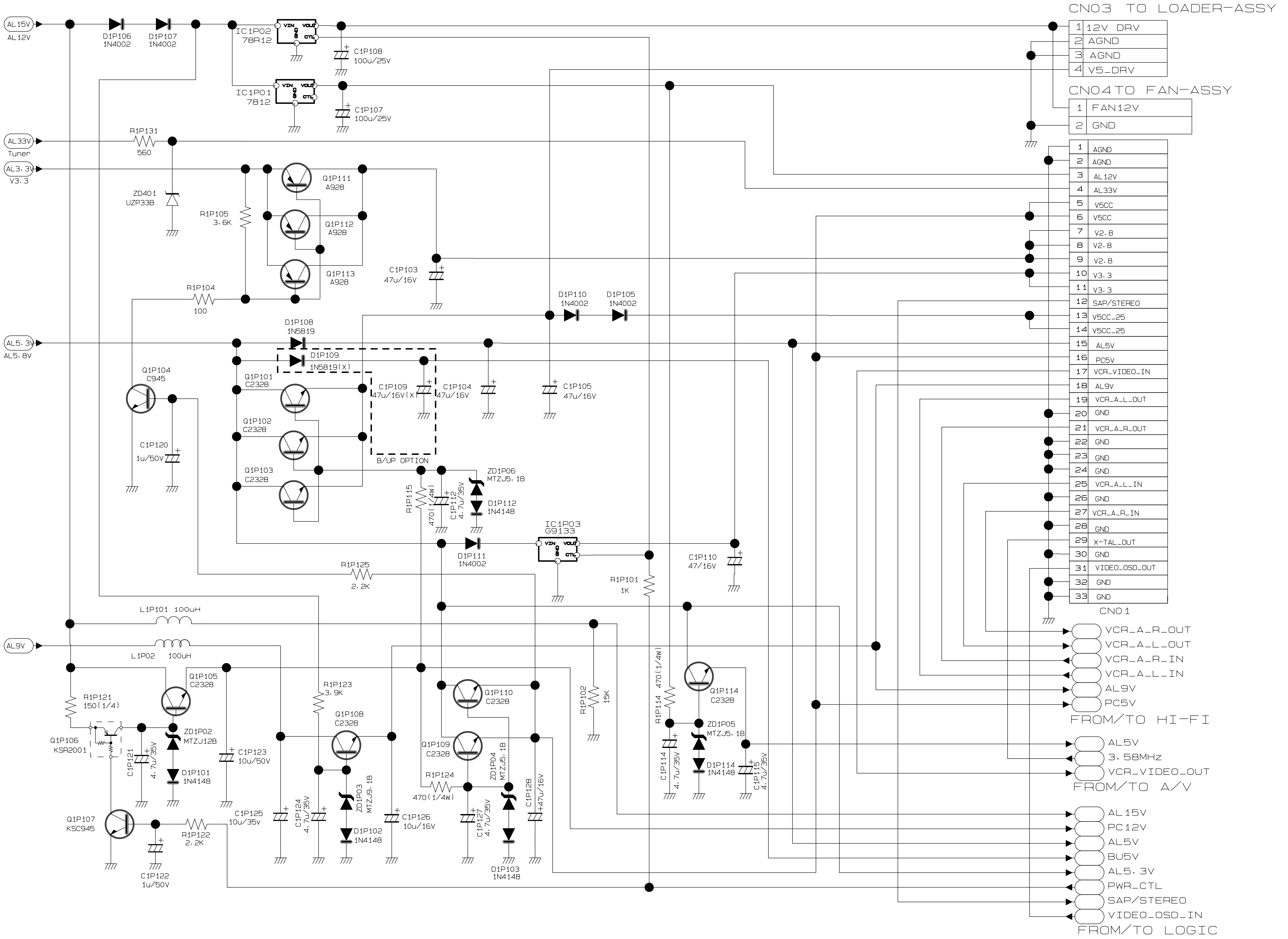
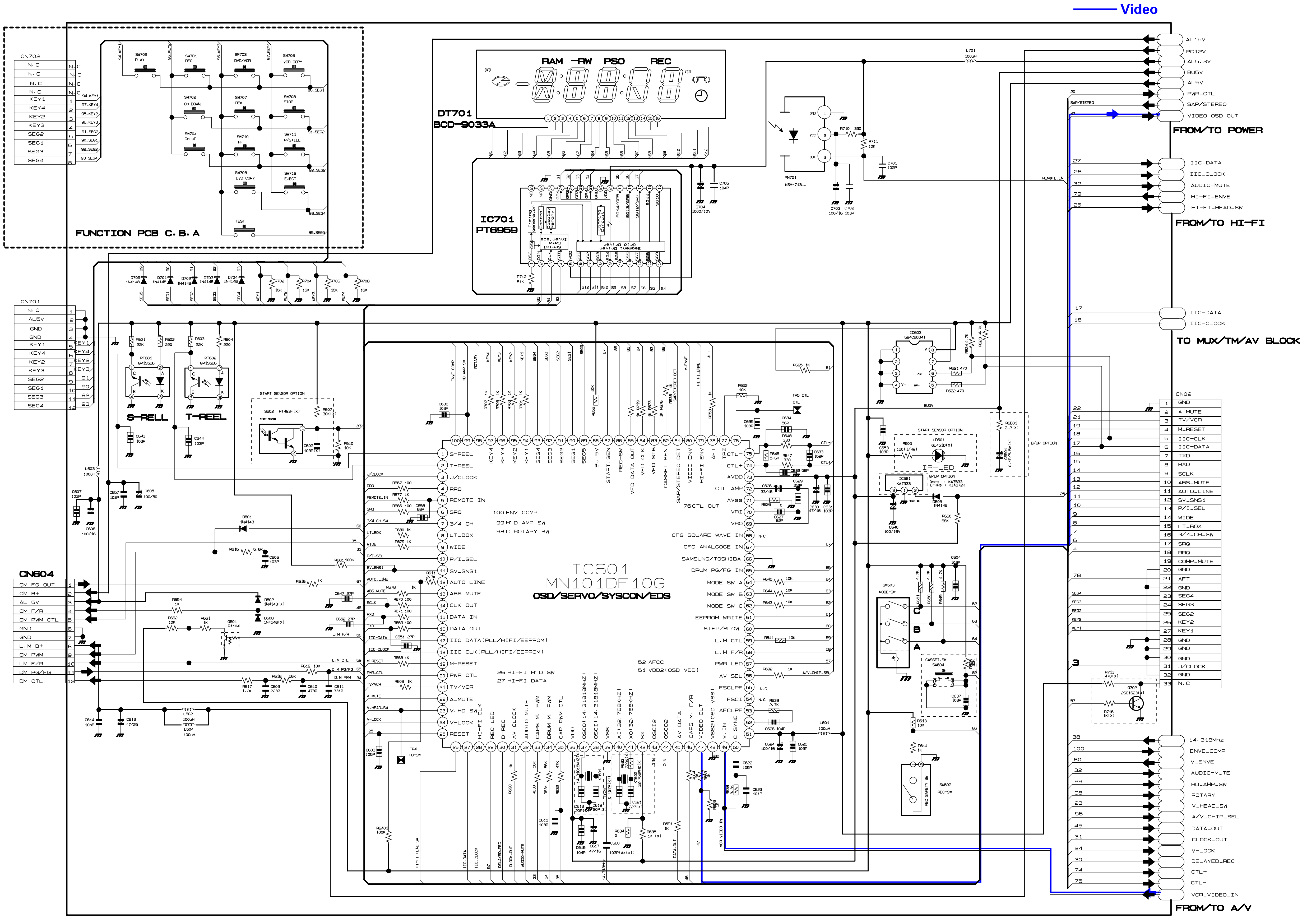
12-2 Power (VCR Main PCB)


CN03 TO LOADER-ASSY
1 12V DRV
2 AGND
3 AGND
4 V5_DRV
CN04TO FAN-ASSY
1 FAN12V
2 GND
AL15V
AL12V
D1P106
1N4002
D1P107
1N4002
IC1P02
78R12
VIN
VOUT
CTL
C1P108
100u/25V
IC1P01
7812
C1P107
100u/25V
AL33V
Tuner
R1P131
560
AL3.3V
V3.3
ZD401
UZP33B
Q1P111
A928
Q1P112
A928
Q1P113
A928
R1P105
3.6K
C1P103
47u/16V
R1P104
100
AL5.3V
AL5.8V
D1P108
1N5819
D1P109
1N5819(X)
D1P110
1N4002
D1P105
1N4002
Q1P104
C945
Q1P101
C2328
Q1P102
C2328
Q1P103
C2328
C1P109
47u/16V(X)
C1P104
47u/16V
C1P105
47u/16V
B/UP OPTION
C1P120
1u/50V
R1P115
470(1/4W)
C1P112
4.7u/35V
ZD1P06
MTZJ5.1B
D1P112
1N4148
IC1P03
G9133
D1P111
1N4002
C1P110
47/16V
R1P125
2.2K
R1P101
1K
1 AGND
2 AGND
3 AL12V
4 AL33V
5 V5CC
6 V5CC
7 V2.8
8 V2.8
9 V2.8
10 V3.3
11 V3.3
12 SAP/STEREO
13 V5CC_25
14 V5CC_25
15 AL5V
16 PC5V
17 VCR_VIDEO_IN
18 AL9V
19 VCR_A_L_OUT
20 GND
21 VCR_A_R_OUT
22 GND
23 GND
24 GND
25 VCR_A_L_IN
26 GND
27 VCR_A_R_IN
28 GND
29 X-TAL_OUT
30 GND
31 VIDEO_OSD_OUT
32 GND
33 GND
CN01
L1P101 100uH
AL9V
L1P02 100uH
Q1P105
C2328
R1P121
150(1/4)
Q1P106
KSR2001
C1P121
4.7u/35V
ZD1P02
MTZJ12B
D1P101
1N4148
C1P123
10u/50V
R1P123
3.9K
Q1P108
C2328
ZD1P03
MTZJ9.1B
D1P102
1N4148
Q1P110
C2328
Q1P109
C2328
R1P124
470(1/4W)
ZD1P04
MTZJ5.1B
D1P103
1N4148
C1P127
4.7u/35V
C1P128
47u/16V
R1P102
15K
R1P114 470(1/4W)
Q1P114
C2328
ZD1P05
MTZJ5.1B
C1P114
4.7u/35V
D1P114
1N4148
C1P115
4.7u/35V
Q1P107
KSC945
C1P122
1u/50V
R1P122
2.2K
C1P125
10u/35V
C1P124
4.7u/35V
C1P126
10u/16V
VCR_A_R_OUT
VCR_A_L_OUT
VCR_A_R_IN
VCR_A_L_IN
AL9V
PC5V
FROM/TO HI-FI
AL5V
3.58MHz
VCR_VIDEO_OUT
FROM/TO A/V
AL15V
PC12V
AL5V
BU5V
AL5.3V
PWR_CTL
SAP/STEREO
VIDEO_OSD_IN
FROM/TO LOGIC

12-3 Logic (VCR Main PCB)


Video
FUNCTION PCB C.B.A
CN702
CN701
CN604
DT701
BCD-9033A
RAM -RW PSO REC
IC701
PT6959
IC601
MN101DF10G
OSD/SERVO/SYSCON/EDS
IC603
RM701
KSM-713LJ
S-RELL
T-REEL
START SENSOR OPTION
IR-LED
SW603
MODE-SW
SW602
REC-SW
SW604
CASSET-SW
AL15V
PC12V
AL5.3V
BU5V
AL5V
PWR_CTL
SAP/STEREO
VIDEO_OSD_OUT
FROM/TO POWER
IIC_DATA
IIC_CLOCK
AUDIO-MUTE
HI-FI_ENVE
HI-FI_HEAD_SW
FROM/TO HI-FI
IIC-DATA
IIC-CLOCK
TO MUX/TM/AV BLOCK
CN02
14.318MHz
ENVE_COMP
V_ENVE
AUDIO-MUTE
HD_AMP_SW
ROTARY
V_HEAD_SW
A/V_CHIP_SEL
DATA_OUT
CLOCK_OUT
V-LOCK
DELAYED_REC
CTL+
CTL-
VCR_VIDEO_IN
FROM/TO A/V

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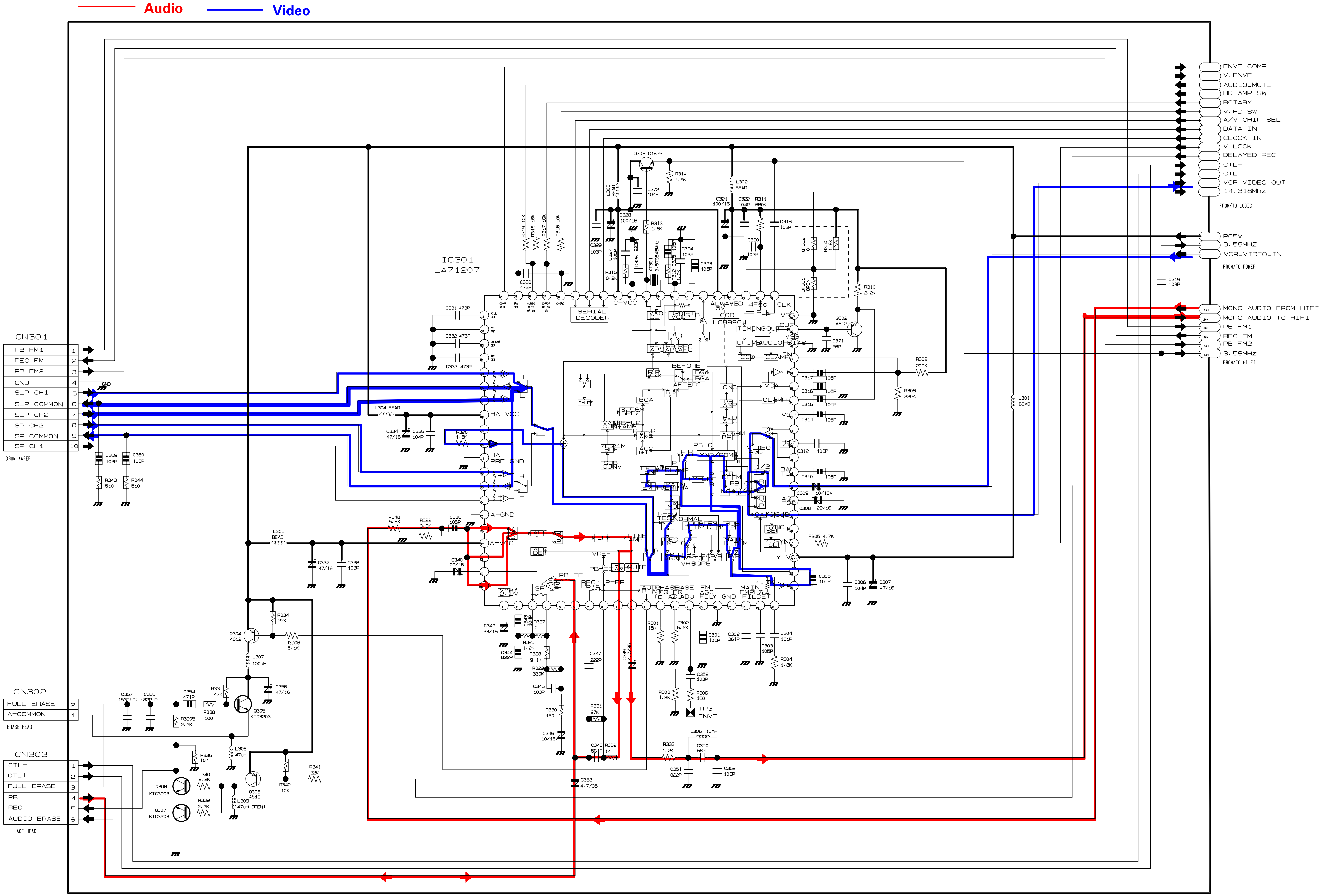
12-4 A/V (VCR Main PCB)


Audio
Video
IC301
LA71207
CN301
PB FM1 1
REC FM 2
PB FM2 3
GND 4
SLP CH1 5
SLP COMMON 6
SLP CH2 7
SP CH2 8
SP COMMON 9
SP CH1 10
DRUM WAFER
CN302
FULL ERASE 2
A-COMMON 1
ERASE HEAD
CN303
CTL- 1
CTL+ 2
FULL ERASE 3
PB 4
REC 5
AUDIO ERASE 6
ACE HEAD
ENVE COMP
V.ENVE
AUDIO_MUTE
HD AMP SW
ROTARY
V.HD SW
A/V_CHIP_SEL
DATA IN
CLOCK IN
V-LOCK
DELAYED REC
CTL+
CTL-
VCR_VIDEO_OUT
14.318Mhz
FROM/TO LOGIC
PC5V
3.58MHZ
VCR_VIDEO_IN
FROM/TO POWER
MONO AUDIO FROM HIFI
MONO AUDIO TO HIFI
PB FM1
REC FM
PB FM2
3.58MHZ
FROM/TO HI-FI
Q303 C1623
Q302 A812
Q304 A812
Q305 KTC3203
Q306 A812
Q307 KTC3203
Q308 KTC3203
X301 3.579545MHz
L301 BEAD
L302 BEAD
L303 BEAD
L304 BEAD
L305 BEAD
L306 15mH
L307 100uH
L308 47uH
L309 47uH(OPEN)
TP3 ENVE
SERIAL DECODER
HA VCC
HA PRE GND
A-GND
A-VCC
Y-VCC
C-VCC
CCD LC89964
TIMING OUT
4fsc
CLK
VSS
BEFORE
AFTER
PB-EE
VREF
MUTE
NORMAL
SYNC SEP
Y-SYNC SEP
AGC TOP
VCA
CLAMP
FM AGC
MAIN EMPHA
FILTER
FILY-GND

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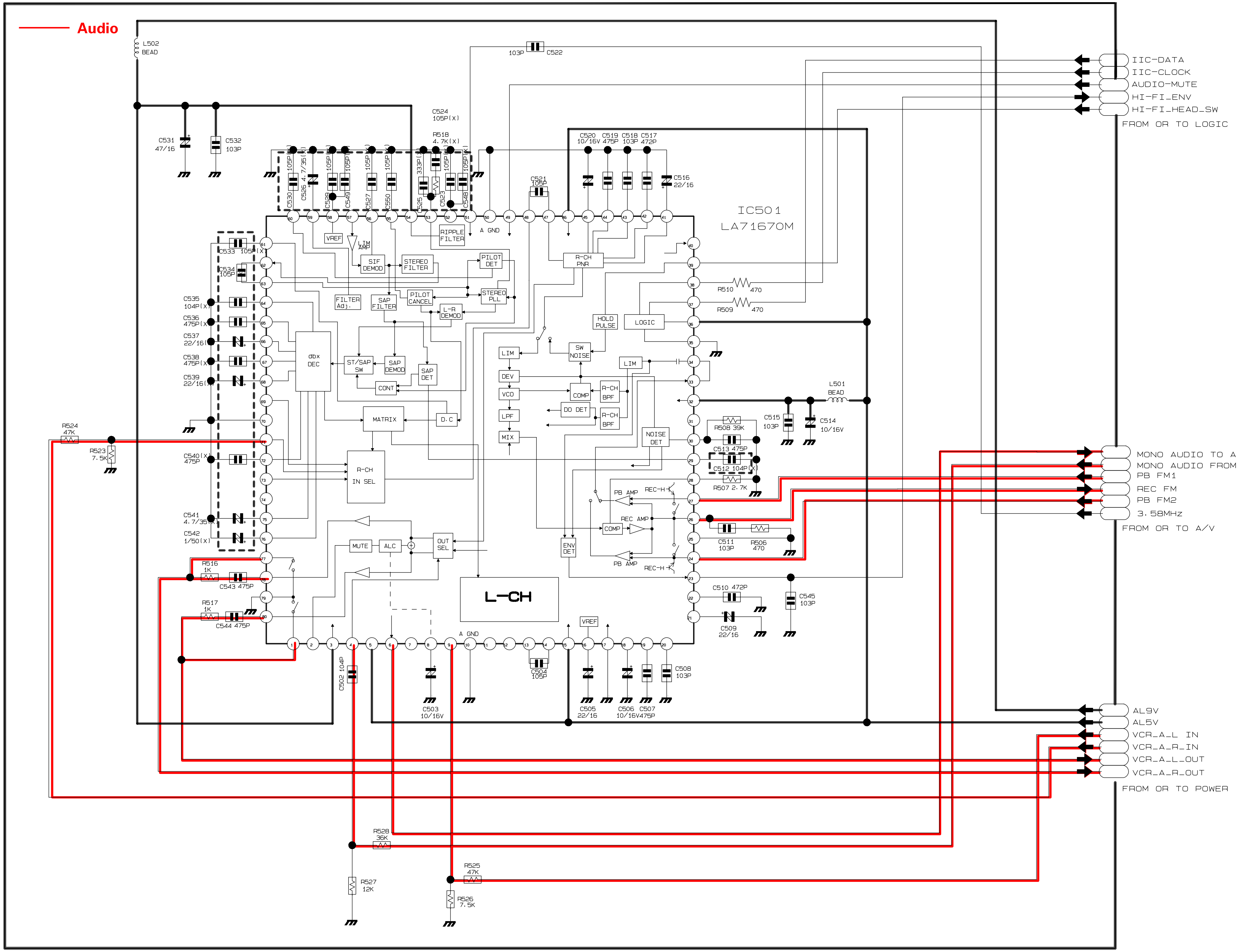
12-5 Hi-Fi (VCR Main PCB)


Audio
IC501
LA71670M
L502 BEAD
L501 BEAD
C531 47/16
C532 103P
C522 103P
C524 105P(X)
R518 4.7K(X)
C530 105P
C526 4.7/35
C529 105P
C549 105P
C527 105P
C550 105P
C525 333P
C523 105P
C548 105P
C521 105P
C520 10/16V
C519 475P
C518 103P
C517 472P
C516 22/16
C533 105P(X)
C534 105P
C535 104P(X)
C536 475P(X)
C537 22/16
C538 475P(X)
C539 22/16
C540 475P
C541 4.7/35
C542 1/50(X)
C543 475P
C544 475P
R524 47K
R523 7.5K
R516 1K
R517 1K
VREF
LIM AMP
SIF DEMOD
STEREO FILTER
RIPPLE FILTER
A GND
PILOT DET
FILTER Adj.
SAP FILTER
PILOT CANCEL
STEREO PLL
L-R DEMOD
dbx DEC
ST/SAP SW
SAP DEMOD
SAP DET
CONT
MATRIX
D.C
R-CH IN SEL
MUTE
ALC
OUT SEL
L-CH
R-CH PNR
HOLD PULSE
LOGIC
SW NOISE
LIM
DEV
VCO
LPF
MIX
COMP
DO DET
R-CH BPF
NOISE DET
PB AMP
REC-H
REC AMP
ENV DET
R510 470
R509 470
R508 39K
C515 103P
C514 10/16V
C513 475P
C512 104P(X)
R507 2.7K
C511 103P
R506 470
C510 472P
C545 103P
C509 22/16
C502 104P
C503 10/16V
C504 105P
C505 22/16
C506 10/16V
C507 475P
C508 103P
R528 36K
R527 12K
R525 47K
R526 7.5K
IIC-DATA
IIC-CLOCK
AUDIO-MUTE
HI-FI_ENV
HI-FI_HEAD_SW
FROM OR TO LOGIC
MONO AUDIO TO AV
MONO AUDIO FROM AV
PB FM1
REC FM
PB FM2
3.58MHz
FROM OR TO A/V
AL9V
AL5V
VCR_A_L IN
VCR_A_R_IN
VCR_A_L_OUT
VCR_A_R_OUT
FROM OR TO POWER

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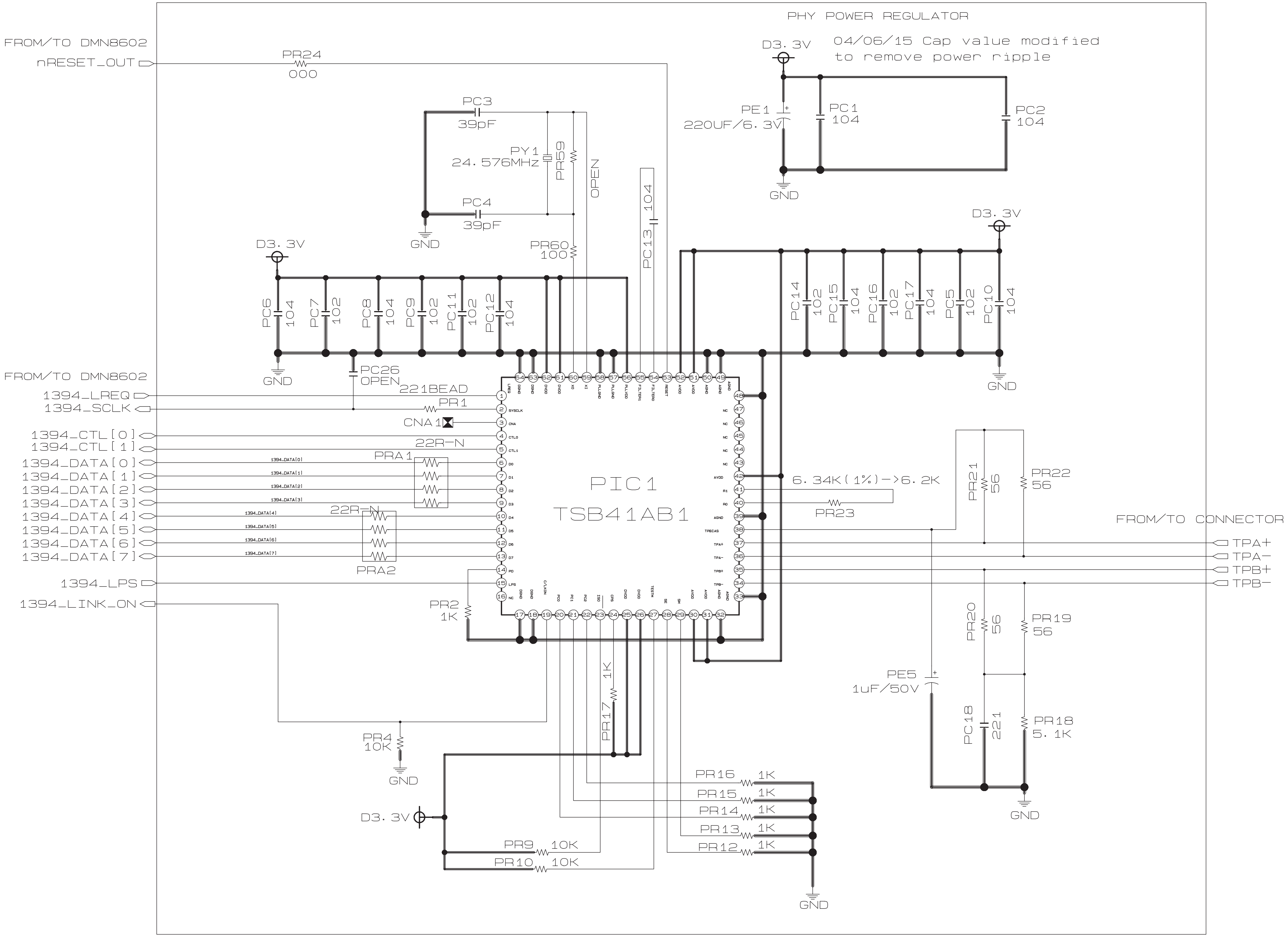
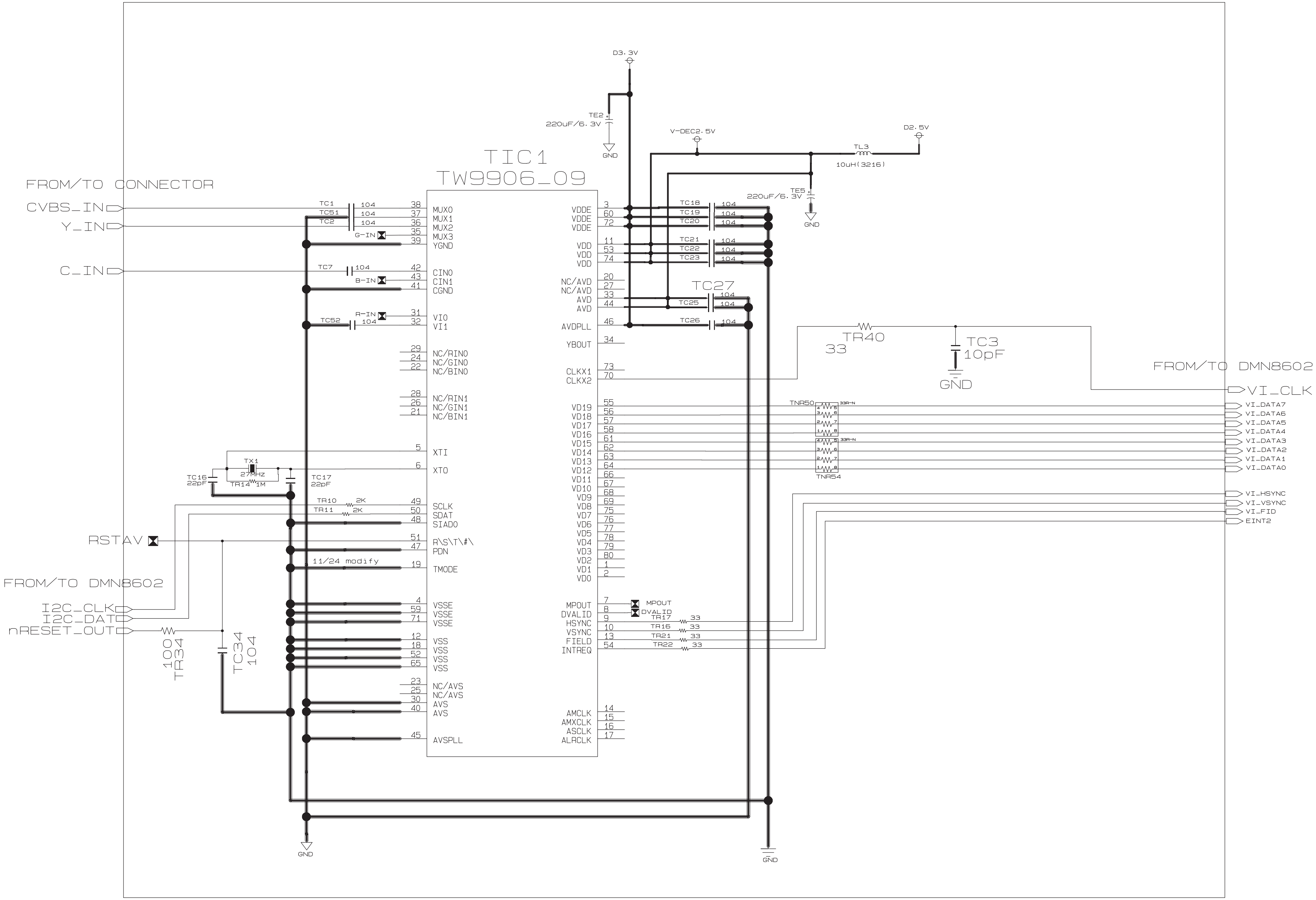
12-6 IEEE 1394 (DVD Main PCB)


PHY POWER REGULATOR
04/06/15 Cap value modified
to remove power ripple
FROM/TO DMN8602
nRESET_OUT
PR24
000
PC3
39pF
PY1
24.576MHz
PR59
OPEN
PC4
39pF
GND
PR60
100
PC13 104
D3.3V
PE1
220UF/6.3V
PC1
104
PC2
104
PC6 104
PC7 102
PC8 104
PC9 102
PC11 102
PC12 104
PC14 102
PC15 104
PC16 102
PC17 104
PC5 102
PC10 104
PC26
OPEN
221BEAD
PR1
CNA1
22R-N
PRA1
PRA2
1394_LREQ
1394_SCLK
1394_CTL[0]
1394_CTL[1]
1394_DATA[0]
1394_DATA[1]
1394_DATA[2]
1394_DATA[3]
1394_DATA[4]
1394_DATA[5]
1394_DATA[6]
1394_DATA[7]
1394_LPS
1394_LINK_ON
PIC1
TSB41AB1
6.34K(1%)->6.2K
PR23
PR21 56
PR22 56
FROM/TO CONNECTOR
TPA+
TPA-
TPB+
TPB-
PR20 56
PR19 56
PE5
1uF/50V
PC18 221
PR18 5.1K
PR2 1K
PR4 10K
PR17 1K
PR16 1K
PR15 1K
PR14 1K
PR13 1K
PR12 1K
PR9 10K
PR10 10K

12-7 Video Decoder (DVD Main PCB)


D3.3V
TE2 220uF/6.3V
GND
V-DEC2.5V
D2.5V
TL3 10uH(3216)
TE5 220uF/6.3V
TIC1
TW9906_09
FROM/TO CONNECTOR
CVBS_IN
Y_IN
C_IN
TC1 104
TC51 104
TC2 104
G-IN
TC7 104
B-IN
R-IN
TC52 104
MUX0 MUX1 MUX2 MUX3 YGND
CIN0 CIN1 CGND
VI0 VI1
NC/RIN0 NC/GIN0 NC/BIN0
NC/RIN1 NC/GIN1 NC/BIN1
XTI XTO
TX1 27MHz
TR14 1M
TC16 22pF
TC17 22pF
TR10 2K
TR11 2K
SCLK SDAT SIAD0
R\S\T\#\ PDN TMODE
11/24 modify
RSTAV
FROM/TO DMN8602
I2C_CLK
I2C_DAT
nRESET_OUT
100 TR34
TC34 104
VSSE VSSE VSSE
VSS VSS VSS VSS
NC/AVS NC/AVS AVS AVS
AVSPLL
VDDE VDDE VDDE
VDD VDD VDD
NC/AVD NC/AVD AVD AVD
AVDPLL
YBOUT
CLKX1 CLKX2
TC18 104
TC19 104
TC20 104
TC21 104
TC22 104
TC23 104
TC27 104
TC25 104
TC26 104
TR40 33
TC3 10pF
GND
FROM/TO DMN8602
VI_CLK
VD19 VD18 VD17 VD16 VD15 VD14 VD13 VD12 VD11 VD10 VD9 VD8 VD7 VD6 VD5 VD4 VD3 VD2 VD1 VD0
TNR50 33R-N
TNR54 33R-N
VI_DATA7
VI_DATA6
VI_DATA5
VI_DATA4
VI_DATA3
VI_DATA2
VI_DATA1
VI_DATA0
VI_HSYNC
VI_VSYNC
VI_FID
EINT2
MPOUT DVALID HSYNC VSYNC FIELD INTREQ
MPOUT
DVALID
TR17 33
TR16 33
TR21 33
TR22 33
AMCLK AMXCLK ASCLK ALRCLK
GND
GND

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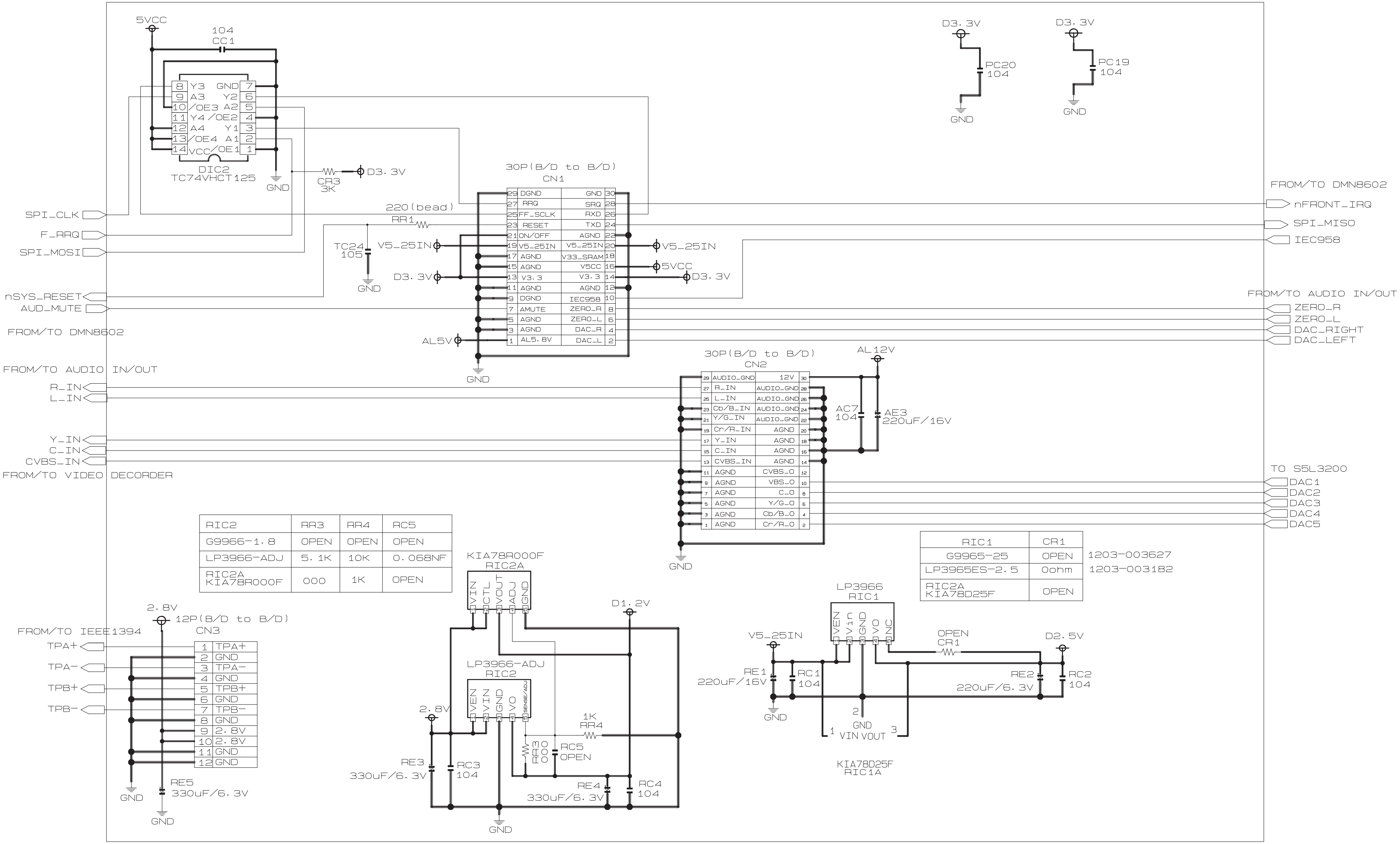
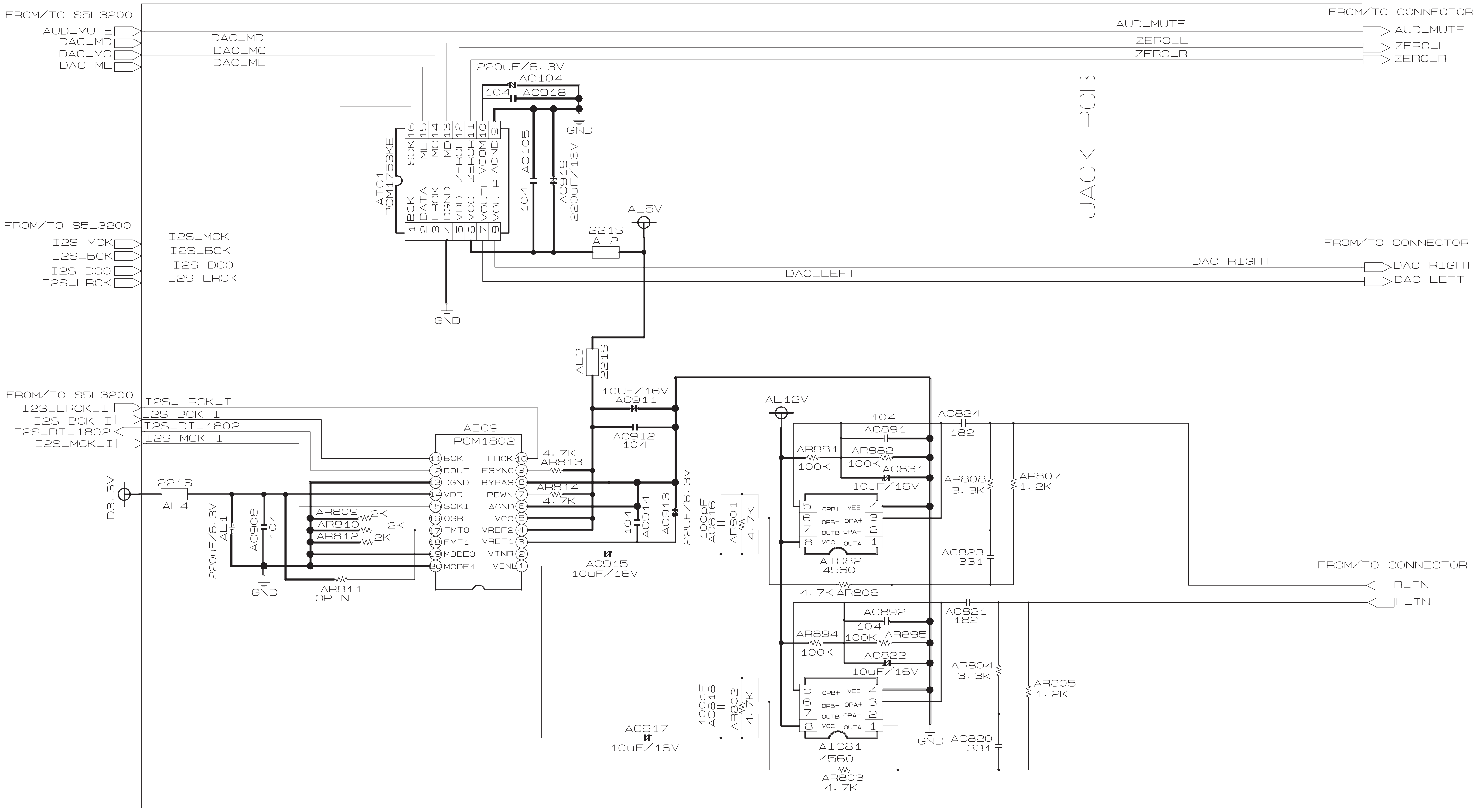
12-8 Connector (DVD Main PCB)


5VCC
104
CC1
DIC2
TC74VHCT125
8 Y3 GND 7
9 A3 Y2 6
10 /OE3 A2 5
11 Y4 /OE2 4
12 A4 Y1 3
13 /OE4 A1 2
14 VCC /OE1 1
GND
CR3
3K
D3.3V
SPI_CLK
F_RRQ
SPI_MOSI
nSYS_RESET
AUD_MUTE
FROM/TO DMN8602
220(bead)
RR1
TC24
105
V5_25IN
GND
30P(B/D to B/D)
CN1
29 DGND GND 30
27 RRQ SRQ 28
25 FF_SCLK RXD 26
23 RESET TXD 24
21 ON/OFF AGND 22
19 V5_25IN V5_25IN 20
17 AGND V33_SRAM 18
15 AGND V5CC 16
13 V3.3 V3.3 14
11 AGND AGND 12
9 DGND IEC958 10
7 AMUTE ZERO_R 8
5 AGND ZERO_L 6
3 AGND DAC_R 4
1 AL5.8V DAC_L 2
AL5V
V5_25IN
5VCC
D3.3V
FROM/TO DMN8602
nFRONT_IRQ
SPI_MISO
IEC958
FROM/TO AUDIO IN/OUT
ZERO_R
ZERO_L
DAC_RIGHT
DAC_LEFT
D3.3V
PC20
104
GND
D3.3V
PC19
104
GND
FROM/TO AUDIO IN/OUT
R_IN
L_IN
Y_IN
C_IN
CVBS_IN
FROM/TO VIDEO DECORDER
30P(B/D to B/D)
CN2
29 AUDIO_GND 12V 30
27 R_IN AUDIO_GND 28
25 L_IN AUDIO_GND 26
23 Cb/B_IN AUDIO_GND 24
21 Y/G_IN AUDIO_GND 22
19 Cr/R_IN AGND 20
17 Y_IN AGND 18
15 C_IN AGND 16
13 CVBS_IN AGND 14
11 AGND CVBS_O 12
9 AGND VBS_O 10
7 AGND C_O 8
5 AGND Y/G_O 6
3 AGND Cb/B_O 4
1 AGND Cr/R_O 2
AL12V
AC7
104
AE3
220uF/16V
GND
TO S5L3200
DAC1
DAC2
DAC3
DAC4
DAC5
FROM/TO IEEE1394
2.8V
12P(B/D to B/D)
CN3
TPA+
TPA-
TPB+
TPB-
1 TPA+
2 GND
3 TPA-
4 GND
5 TPB+
6 GND
7 TPB-
8 GND
9 2.8V
10 2.8V
11 GND
12 GND
GND
RE5
330uF/6.3V
GND
KIA78R000F
RIC2A
VIN CTL VOUT ADJ GND
1 2 3 4 5
D1.2V
LP3966-ADJ
RIC2
VEN VIN GND VO SENSE/ADJ
2.8V
1K
RR4
RR3
000
RC5
OPEN
RE3
330uF/6.3V
RC3
104
RE4
330uF/6.3V
RC4
104
GND
LP3966
RIC1
VEN Vin GND VO NC
V5_25IN
RE1
220uF/16V
RC1
104
GND
OPEN
CR1
D2.5V
RE2
220uF/6.3V
RC2
104
1 GND 2 VIN VOUT 3
KIA78D25F
RIC1A

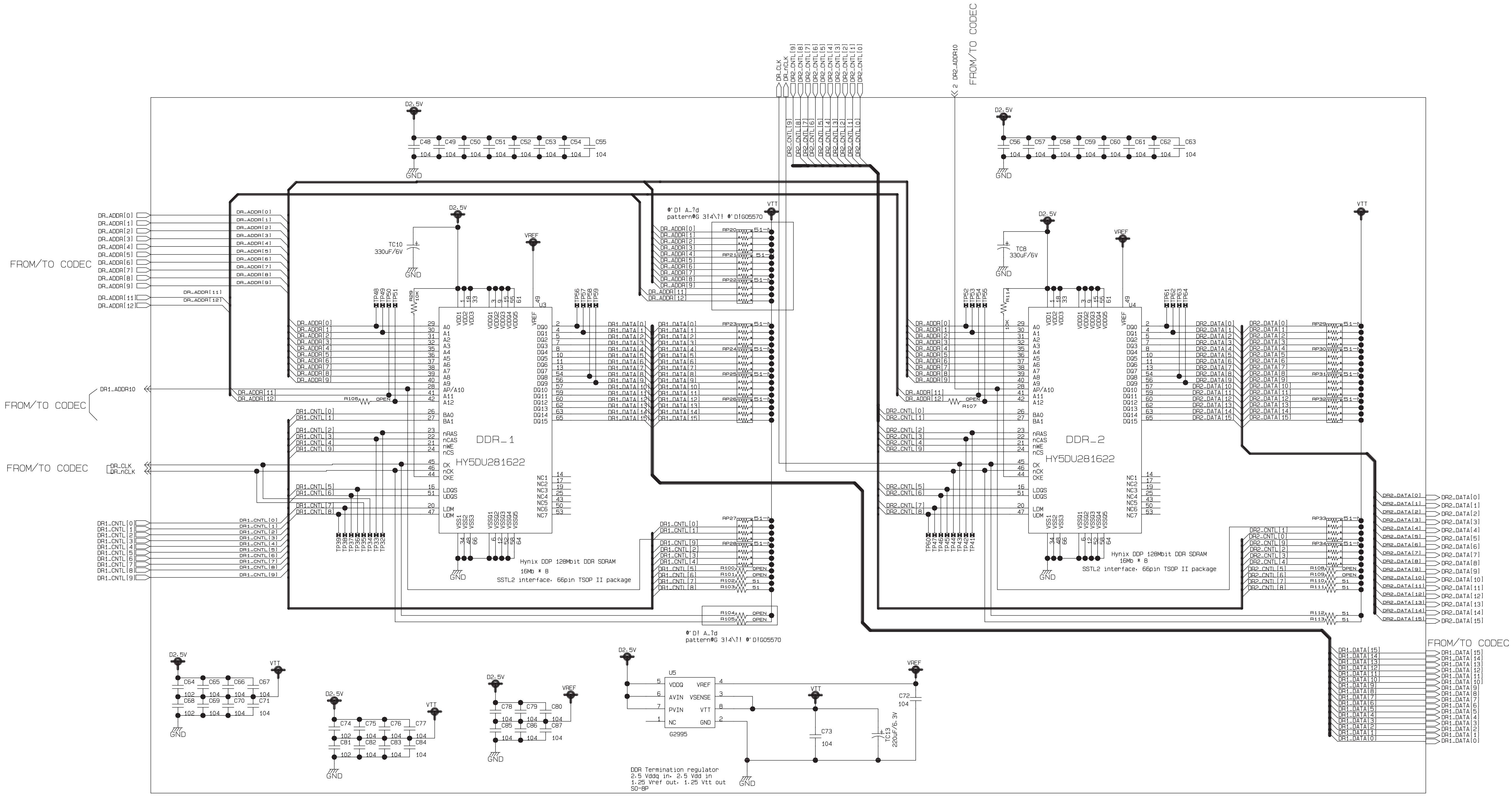
RIC2	RR3	RR4	RC5
G9966-1.8	OPEN	OPEN	OPEN
LP3966-ADJ	5.1K	10K	0.068NF
RIC2A KIA78R000F	000	1K	OPEN

RIC1	CR1	
G9965-25	OPEN	1203-003627
LP3965ES-2.5	0ohm	1203-003182
RIC2A KIA78D25F	OPEN	

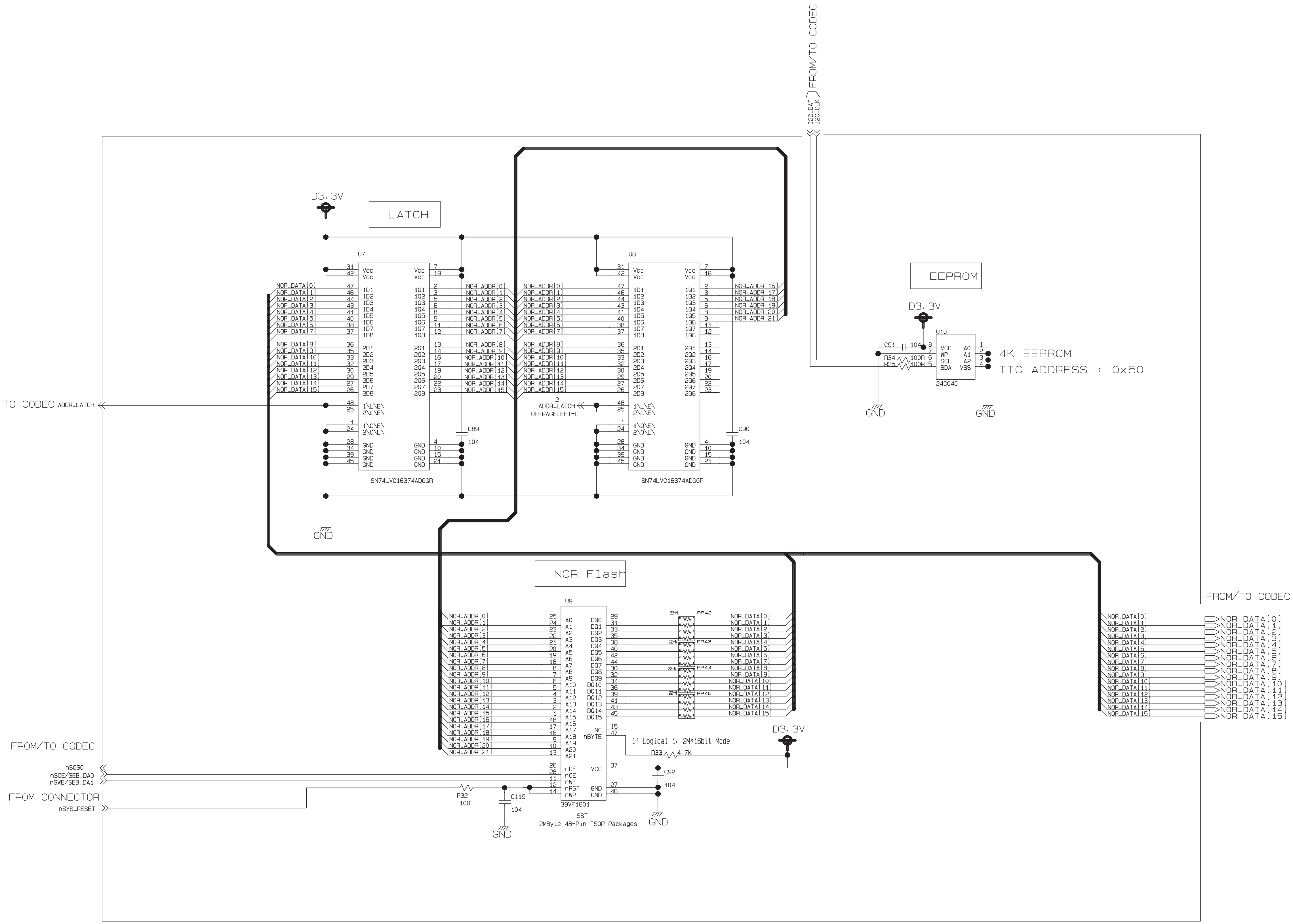
12-9 Audio In/Out (DVD Main PCB)


FROM/TO S5L3200
AUD_MUTE
DAC_MD
DAC_MC
DAC_ML
FROM/TO CONNECTOR
ZERO_L
ZERO_R
220uF/6.3V
AC104
104
AC918
GND
AIC1
PCM1753KE
SCK
ML
MC
MD
ZEROL
ZEROR
VCOM
AGND
BCK
DATA
LRCK
DGND
VDD
VCC
VOUTL
VOUTR
AC105
AC919
220uF/16V
JACK PCB
AL5V
221S
AL2
I2S_MCK
I2S_BCK
I2S_DOO
I2S_LRCK
DAC_RIGHT
DAC_LEFT
AL3
10UF/16V
AC911
AC912
AL12V
AC824
182
AC891
AR881
100K
AR882
AC831
10uF/16V
AR808
3.3K
AR807
1.2K
I2S_LRCK_I
I2S_BCK_I
I2S_DI_1802
I2S_MCK_I
AIC9
PCM1802
LRCK
FSYNC
BYPAS
PDWN
AGND
VREF2
VREF1
VINR
VINL
DOUT
OSR
FMT0
FMT1
MODE0
MODE1
SCKI
4.7K
AR813
AR814
D3.3V
AL4
AE1
AC908
AR809
2K
AR810
AR812
AR811
OPEN
AC914
AC913
22UF/6.3V
100pF
AC816
AR801
OPB+
OPB-
OUTB
VEE
OPA+
OPA-
OUTA
AIC82
4560
AC823
331
AC915
R_IN
L_IN
AR806
AC892
AC821
AR894
AR895
AC822
AR804
AR805
AC818
AR802
AIC81
AC917
AC820
AR803

12-10 DDR (DVD Main PCB)


FROM/TO CODEC
DDR_1
HY5DU281622
DDR_2
HY5DU281622
Hynix DDP 128Mbit DDR SDRAM
16Mb * 8
SSTL2 interface, 66pin TSOP II package
U3
U4
U5
G2995
VDDQ
AVIN
PVIN
NC
VREF
VSENSE
VTT
GND
DDR Termination regulator
2.5 Vddq in, 2.5 Vdd in
1.25 Vref out, 1.25 Vtt out
SO-8P
D2.5V
VTT
VREF
GND
TC10
330uF/6V
TC8
330uF/6V
TC13
220uF/6.3V
DR_ADDR[0]
DR_ADDR[12]
DR1_ADDR10
DR2_ADDR10
DR_CLK
DR_nCLK
DR1_CNTL[0]
DR1_CNTL[9]
DR2_CNTL[0]
DR2_CNTL[9]
DR1_DATA[0]
DR1_DATA[15]
DR2_DATA[0]
DR2_DATA[15]

12-11 Nor Flash (DVD Main PCB)


FROM/TO CODEC
I2C_DAT
I2C_CLK
LATCH
D3.3V
U7
SN74LVC16374ADGGR
U8
SN74LVC16374ADGGR
NOR_DATA[0] … NOR_DATA[15]
NOR_ADDR[0] … NOR_ADDR[21]
TO CODEC ADDR_LATCH
ADDR_LATCH
OFFPAGELEFT-L
C89
104
C90
104
GND
EEPROM
U10
24C040
C91
R34
R35
100R
4K EEPROM
IIC ADDRESS : 0x50
NOR Flash
U9
39VF1601
SST
2MByte 48-Pin TSOP Packages
RP42
RP43
RP44
RP45
22*4
if Logical 1, 2M*16bit Mode
R33
4.7K
C92
104
FROM/TO CODEC
nSCS0
nSOE/SEB_DA0
nSWE/SEB_DA1
FROM CONNECTOR
nSYS_RESET
R32
100
C119
104

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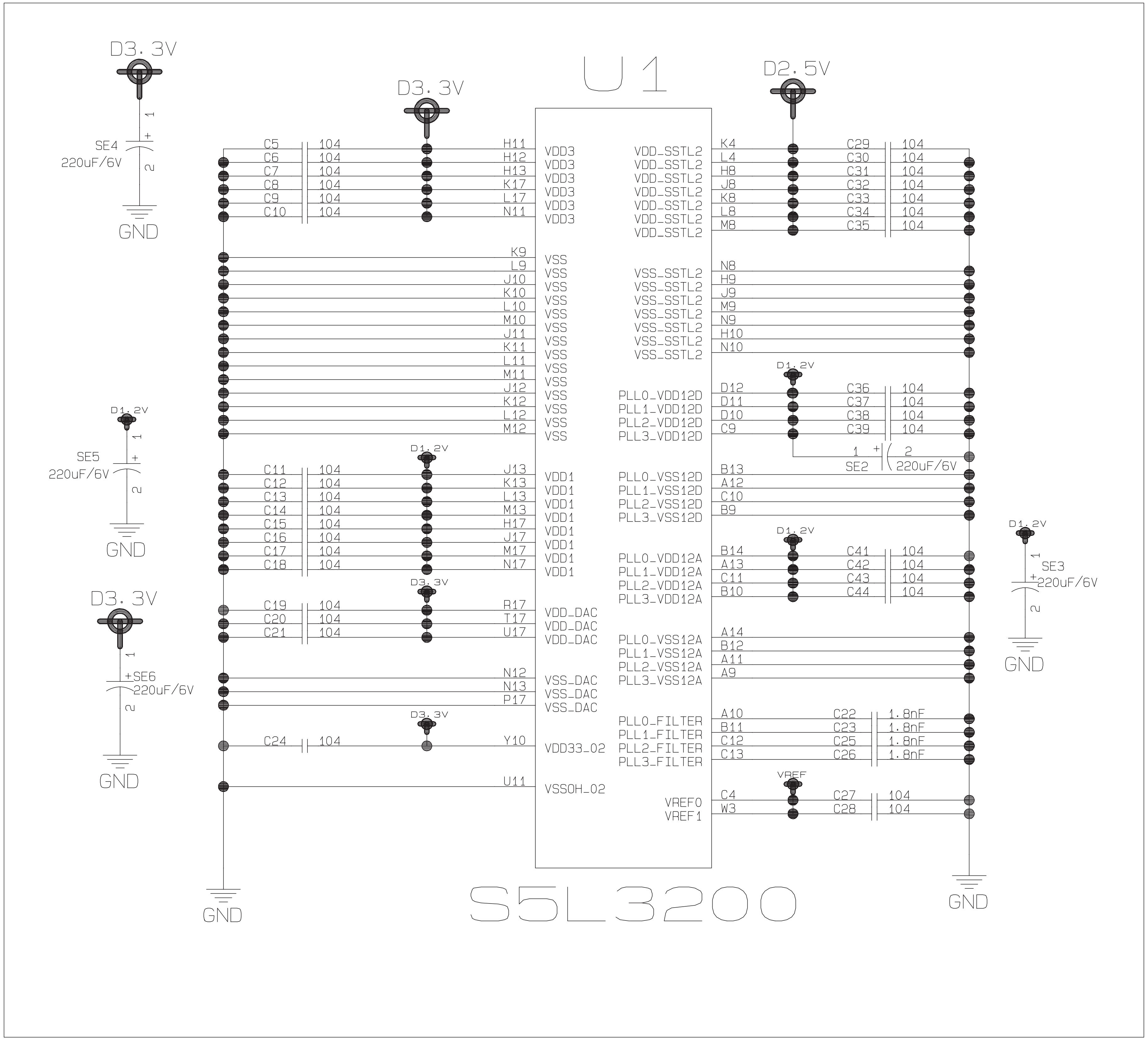
12-12 Power (DVD Main PCB)


U1
S5L3200
D3.3V
D2.5V
D1.2V
VREF
GND
SE4 220uF/6V
SE5 220uF/6V
SE6 220uF/6V
SE2 220uF/6V
SE3 220uF/6V
C5 C6 C7 C8 C9 C10 104
H11 H12 H13 K17 L17 N11 VDD3
K9 L9 J10 K10 L10 M10 J11 K11 L11 M11 J12 K12 L12 M12 VSS
C11 C12 C13 C14 C15 C16 C17 C18 104
J13 K13 L13 M13 H17 J17 M17 N17 VDD1
C19 C20 C21 104
R17 T17 U17 VDD_DAC
N12 N13 P17 VSS_DAC
C24 104 Y10 VDD33_02
U11 VSSOH_02
K4 L4 H8 J8 K8 L8 M8 VDD_SSTL2
C29 C30 C31 C32 C33 C34 C35 104
N8 H9 J9 M9 N9 H10 N10 VSS_SSTL2
D12 D11 D10 C9 PLL0_VDD12D PLL1_VDD12D PLL2_VDD12D PLL3_VDD12D
C36 C37 C38 C39 104
B13 A12 C10 B9 PLL0_VSS12D PLL1_VSS12D PLL2_VSS12D PLL3_VSS12D
B14 A13 C11 B10 PLL0_VDD12A PLL1_VDD12A PLL2_VDD12A PLL3_VDD12A
C41 C42 C43 C44 104
A14 B12 A11 A9 PLL0_VSS12A PLL1_VSS12A PLL2_VSS12A PLL3_VSS12A
A10 B11 C12 C13 PLL0_FILTER PLL1_FILTER PLL2_FILTER PLL3_FILTER
C22 C23 C25 C26 1.8nF
C4 W3 VREF0 VREF1
C27 C28 104

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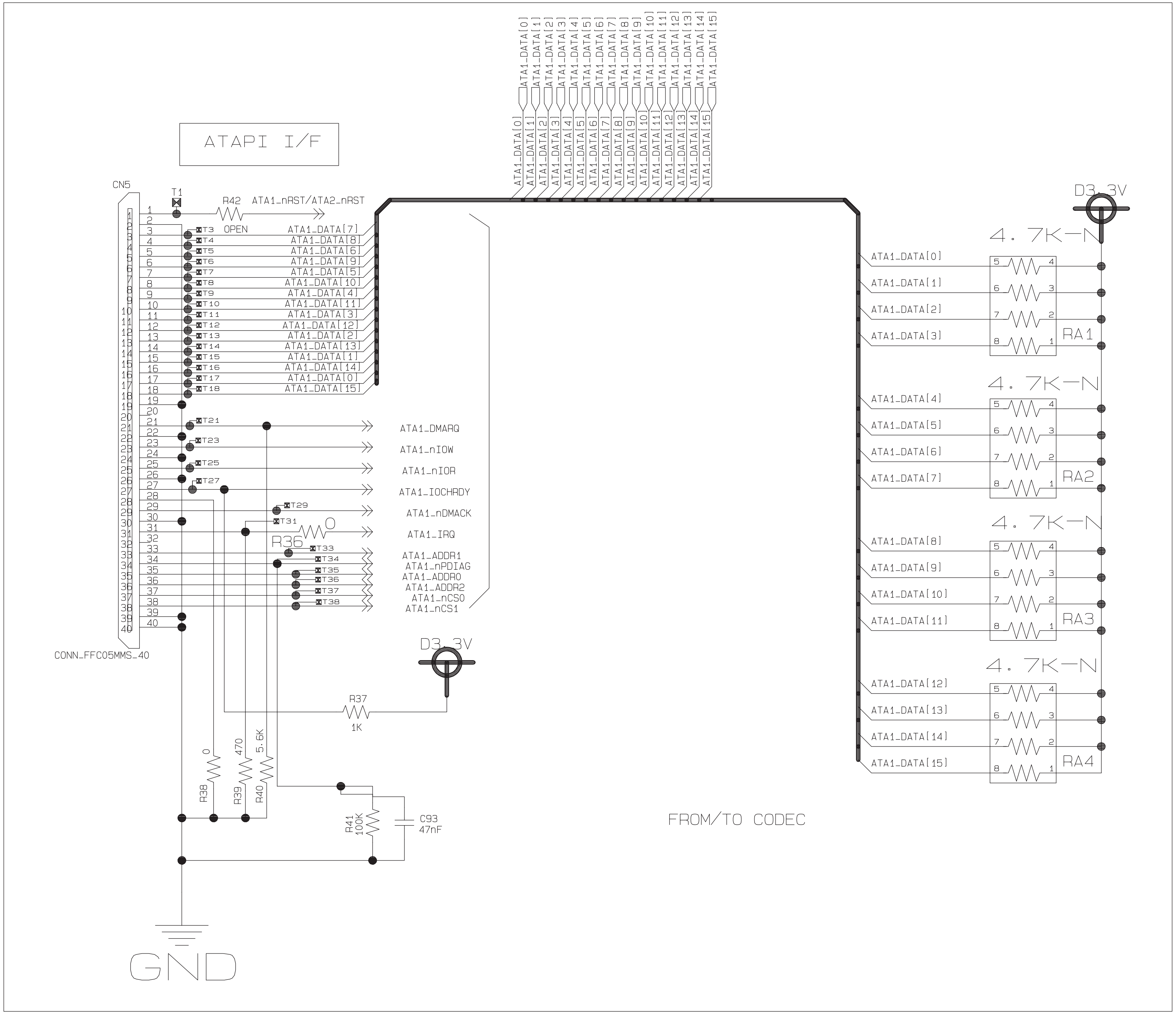
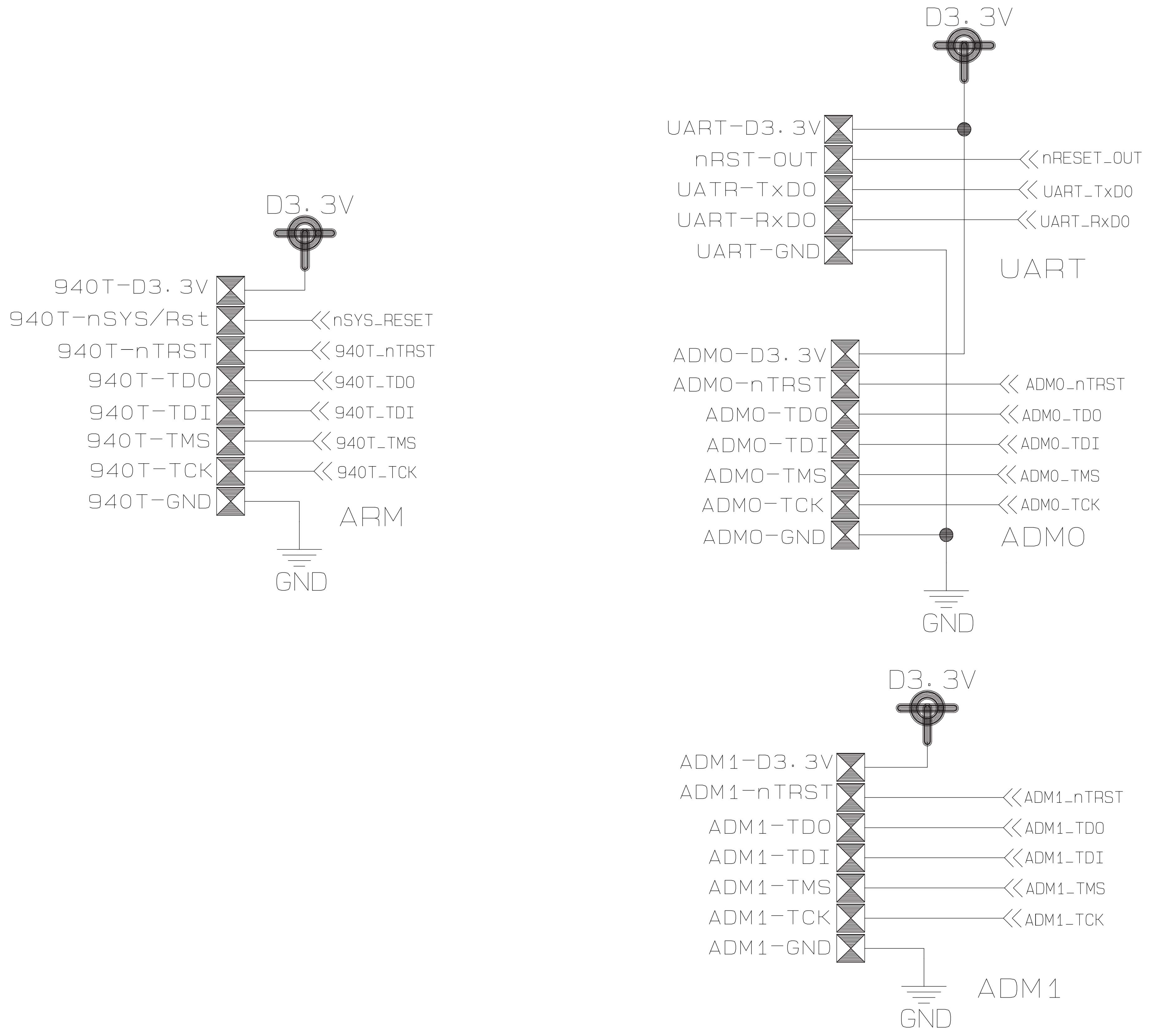
12-13 Atapi (DVD Main PCB)


ATAPI I/F
CN5
CONN_FFC05MMS_40
T1
R42 ATA1_nRST/ATA2_nRST
OPEN
T3 ATA1_DATA[7]
T4 ATA1_DATA[8]
T5 ATA1_DATA[6]
T6 ATA1_DATA[9]
T7 ATA1_DATA[5]
T8 ATA1_DATA[10]
T9 ATA1_DATA[4]
T10 ATA1_DATA[11]
T11 ATA1_DATA[3]
T12 ATA1_DATA[12]
T13 ATA1_DATA[2]
T14 ATA1_DATA[13]
T15 ATA1_DATA[1]
T16 ATA1_DATA[14]
T17 ATA1_DATA[0]
T18 ATA1_DATA[15]
T21 ATA1_DMARQ
T23 ATA1_nIOW
T25 ATA1_nIOR
T27 ATA1_IOCHRDY
T29 ATA1_nDMACK
T31 ATA1_IRQ
R36 0
T33 ATA1_ADDR1
T34 ATA1_nPDIAG
T35 ATA1_ADDR0
T36 ATA1_ADDR2
T37 ATA1_nCS0
T38 ATA1_nCS1
D3.3V
R37 1K
R38 0
R39 470
R40 5.6K
R41 100K
C93 47nF
GND
D3.3V
4.7K-N RA1
4.7K-N RA2
4.7K-N RA3
4.7K-N RA4
ATA1_DATA[0] … ATA1_DATA[15]
FROM/TO CODEC

12-14 UART_IR_HOST (DVD Main PCB)


D3.3V
UART-D3.3V
nRST-OUT
UATR-TxD0
UART-RxD0
UART-GND
nRESET_OUT
UART_TxD0
UART_RxD0
UART
D3.3V
940T-D3.3V
940T-nSYS/Rst
940T-nTRST
940T-TDO
940T-TDI
940T-TMS
940T-TCK
940T-GND
nSYS_RESET
940T_nTRST
940T_TDO
940T_TDI
940T_TMS
940T_TCK
ARM
GND
ADM0-D3.3V
ADM0-nTRST
ADM0-TDO
ADM0-TDI
ADM0-TMS
ADM0-TCK
ADM0-GND
ADM0_nTRST
ADM0_TDO
ADM0_TDI
ADM0_TMS
ADM0_TCK
ADM0
GND
D3.3V
ADM1-D3.3V
ADM1-nTRST
ADM1-TDO
ADM1-TDI
ADM1-TMS
ADM1-TCK
ADM1-GND
ADM1_nTRST
ADM1_TDO
ADM1_TDI
ADM1_TMS
ADM1_TCK
ADM1
GND

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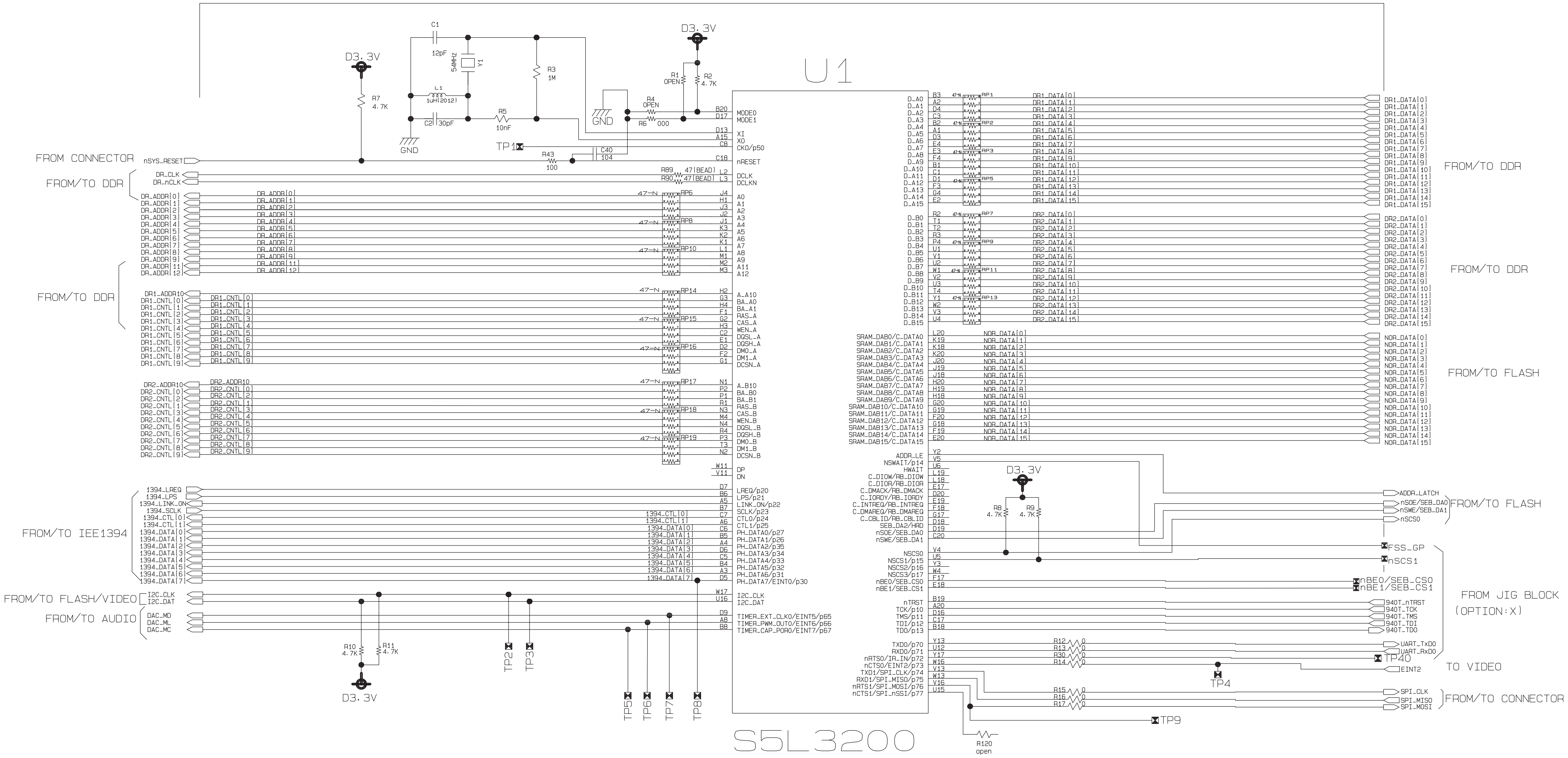
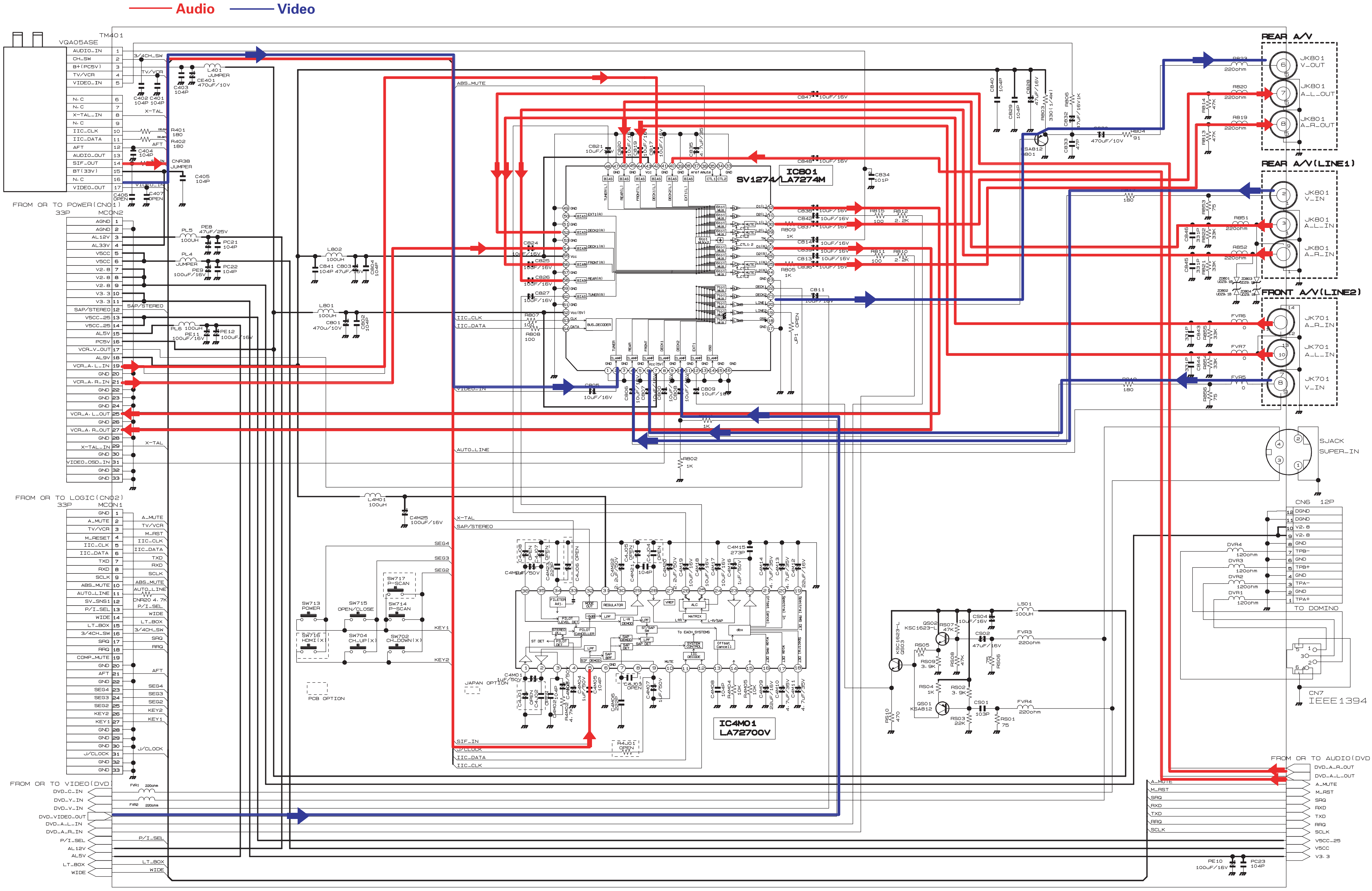
12-15 S5L3200 Memory (DVD Main PCB)


U1
S5L3200
D3.3V
C1
12pF
54MHz
Y1
R3
1M
L1
1uH(2012)
C2
30pF
R5
10nF
GND
R7
4.7K
R1
OPEN
R2
4.7K
R4
OPEN
R6
000
TP1
R43
100
C40
104
FROM CONNECTOR
nSYS_RESET
FROM/TO DDR
DR_CLK
DR_nCLK
R89
R90
47(BEAD)
DR_ADDR[0]
DR_ADDR[12]
RP6
RP8
RP10
RP14
RP15
RP16
RP17
RP18
RP19
47-N
DR1_ADDR10
DR1_CNTL[0]
DR1_CNTL[9]
DR2_ADDR10
DR2_CNTL[0]
DR2_CNTL[9]
MODE0
MODE1
XI
XO
CKO/p50
nRESET
DCLK
DCLKN
A0
A12
A_A10
BA_A0
BA_A1
RAS_A
CAS_A
WEN_A
DQSL_A
DQSH_A
DM0_A
DM1_A
DCSN_A
A_B10
BA_B0
BA_B1
RAS_B
CAS_B
WEN_B
DQSL_B
DQSH_B
DM0_B
DM1_B
DCSN_B
DP
DN
FROM/TO IEE1394
1394_LREQ
1394_LPS
1394_LINK_ON
1394_SCLK
1394_CTL[0]
1394_CTL[1]
1394_DATA[0]
1394_DATA[7]
LREQ/p20
LPS/p21
LINK_ON/p22
SCLK/p23
CTL0/p24
CTL1/p25
PH_DATA0/p27
PH_DATA7/EINT0/p30
FROM/TO FLASH/VIDEO
I2C_CLK
I2C_DAT
FROM/TO AUDIO
DAC_MD
DAC_ML
DAC_MC
TIMER_EXT_CLK0/EINT5/p65
TIMER_PWM_OUT0/EINT6/p66
TIMER_CAP_POR0/EINT7/p67
R10
4.7K
R11
4.7K
TP2
TP3
TP5
TP6
TP7
TP8
D_A0
D_A15
D_B0
D_B15
RP1
RP2
RP3
RP5
RP7
RP9
RP11
RP13
DR1_DATA[0]
DR1_DATA[15]
DR2_DATA[0]
DR2_DATA[15]
FROM/TO DDR
SRAM_DAB0/C_DATA0
SRAM_DAB15/C_DATA15
NOR_DATA[0]
NOR_DATA[15]
FROM/TO FLASH
ADDR_LE
NSWAIT/p14
HWAIT
C_DIOW/RB_DIOW
C_DIOR/RB_DIOR
C_DMACK/RB_DMACK
C_IORDY/RB_IORDY
C_INTREQ/RB_INTREQ
C_DMAREQ/RB_DMAREQ
C_CBLID/RB_CBLID
SEB_DA2/HAD
nSOE/SEB_DA0
nSWE/SEB_DA1
NSCS0
NSCS1/p15
NSCS2/p16
NSCS3/p17
nBE0/SEB_CS0
nBE1/SEB_CS1
R8
4.7K
R9
4.7K
ADDR_LATCH
nSOE/SEB_DA0
nSWE/SEB_DA1
nSCS0
FSS_GP
nSCS1
nBE0/SEB_CS0
nBE1/SEB_CS1
nTRST
TCK/p10
TMS/p11
TDI/p12
TDO/p13
940T_nTRST
940T_TCK
940T_TMS
940T_TDI
940T_TDO
FROM JIG BLOCK
(OPTION:X)
TXD0/p70
RXD0/p71
nRTS0/IR_IN/p72
nCTS0/EINT2/p73
TXD1/SPI_CLK/p74
RXD1/SPI_MISO/p75
nRTS1/SPI_MOSI/p76
nCTS1/SPI_nSSI/p77
R12
R13
R30
R14
R15
R16
R17
0
UART_TxD0
UART_RxD0
TP40
EINT2
TP4
TO VIDEO
SPI_CLK
SPI_MISO
SPI_MOSI
FROM/TO CONNECTOR
TP9
R120
open

12-16 MUX & TM & A/V Input (Jack PCB)


Audio
Video
TM401
VGA05ASE
FROM OR TO POWER(CN01)
33P MCON2
FROM OR TO LOGIC(CN02)
33P MCON1
FROM OR TO VIDEO(DVD)
IC801
SV1274/LA7274M
IC4M01
LA72700V
REAR A/V
JK801
V_OUT
A_L_OUT
A_R_OUT
REAR A/V(LINE1)
V_IN
A_L_IN
A_R_IN
FRONT A/V(LINE2)
JK701
SJACK
SUPER_IN
CN6 12P
TO DOMINO
CN7
IEEE1394
FROM OR TO AUDIO(DVD)
DVD_A_R_OUT
DVD_A_L_OUT
JAPAN OPTION
PCB OPTION
SW713 POWER
SW715 OPEN/CLOSE
SW714 P-SCAN
SW717 P-SCAN
SW716 HDMI(X)
SW704 CH_UP(X)
SW702 CH_DOWN(X)

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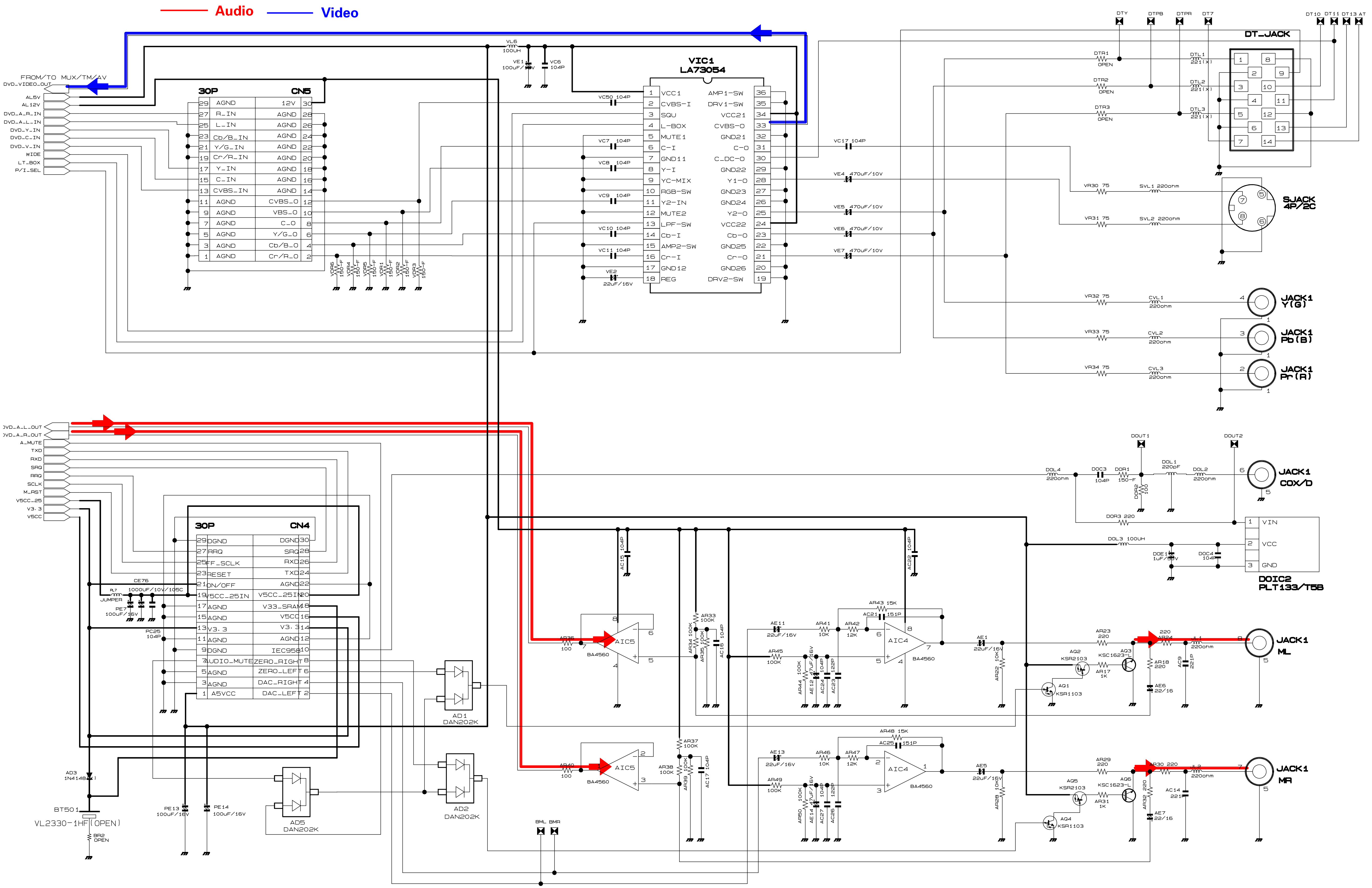
12-17 A/V Out (Jack PCB)


Audio
Video
FROM/TO MUX/TM/AV
DVD_VIDEO_OUT
AL5V
AL12V
DVD_A_R_IN
DVD_A_L_IN
DVD_Y_IN
DVD_C_IN
DVD_V_IN
WIDE
LT_BOX
P/I_SEL
30P
CN5
VL6 100UH
VE1 100uF/16V
VC6 104P
VIC1
LA73054
VCC1
CVBS-I
SQU
L-BOX
MUTE1
C-I
GND11
Y-I
YC-MIX
RGB-SW
Y2-IN
MUTE2
LPF-SW
Cb-I
AMP2-SW
Cr-I
GND12
REG
AMP1-SW
DRV1-SW
VCC21
CVBS-O
GND21
C-O
C_DC-O
GND22
Y1-O
GND23
GND24
Y2-O
VCC22
Cb-O
GND25
Cr-O
GND26
DRV2-SW
VC17 104P
VE4 470uF/10V
VE5 470uF/10V
VE6 470uF/10V
VE7 470uF/10V
DT_JACK
DTY
DTPB
DTPR
DT7
DT10
DT11
DT13 AT
DTR1 OPEN
DTR2 OPEN
DTR3 OPEN
DTL1 221(X)
DTL2 221(X)
DTL3 221(X)
VR30 75
VR31 75
SVL1 220ohm
SVL2 220ohm
SJACK 4P/2C
VR32 75
VR33 75
VR34 75
CVL1 220ohm
CVL2 220ohm
CVL3 220ohm
JACK1 Y(G)
JACK1 Pb(B)
JACK1 Pr(R)
DVD_A_L_OUT
DVD_A_R_OUT
A_MUTE
TXD
RXD
SRQ
RRQ
SCLK
M_RST
V5CC_25
V3.3
V5CC
30P
CN4
DGND
RRQ
FF_SCLK
RESET
ON/OFF
V5CC_25IN
AGND
V3.3
AUDIO_MUTE
A5VCC
SRQ
RXD
TXD
V33_SRAM
V5CC
IEC958
ZERO_RIGHT
ZERO_LEFT
DAC_RIGHT
DAC_LEFT
CE76 1000UF/10V/105C
JUMPER
PE7 100uF/16V
PC25 104P
AD3 1N4148
BT501
VL2330-1HF(OPEN)
BR2 OPEN
PE13 100uF/16V
PE14 100uF/16V
AD5 DAN202K
AD1 DAN202K
AD2 DAN202K
AIC5
BA4560
AIC4
BA4560
AR35 100
AR40 100
AR33 100K
AR38 100K
AR37 100K
AE11 22uF/16V
AE13 22uF/16V
AR41 10K
AR42 12K
AR43 15K
AC21 151P
AR46 10K
AR47 12K
AR48 15K
AC25 151P
AR45 100K
AR49 100K
AE1 22uF/16V
AE5 22uF/16V
AR23 220
AR29 220
AR24 220
AR30 220
AQ1 KSR1103
AQ2 KSR2103
AQ3 KSC1623-L
AQ4 KSR1103
AQ5 KSR2103
AQ6 KSC1623-L
AE6 22/16
AE7 22/16
AC14 221P
JACK1 ML
JACK1 MR
BML
BMR
DOUT1
DOUT2
DOL4 220ohm
DOC3 104P
DOR1 150-F
DOL1 220pF
DOL2 220ohm
JACK1 COX/D
DOR3 220
DOL3 100UH
DOE1 1uF/50V
DOC4 104P
VIN
VCC
GND
DOIC2
PLT133/T5B

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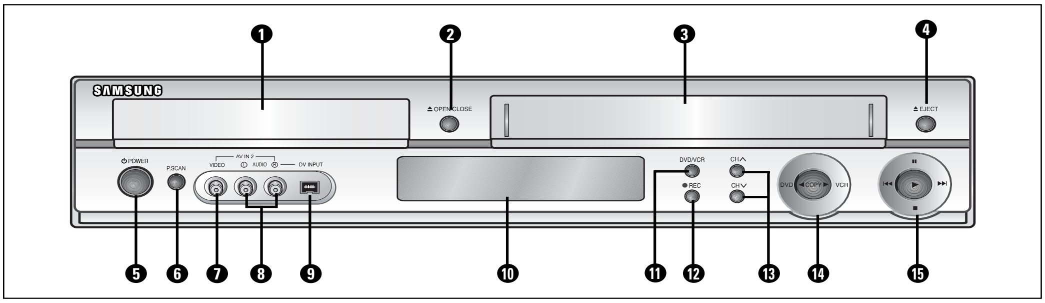
MEMO

13. Operating Instructions

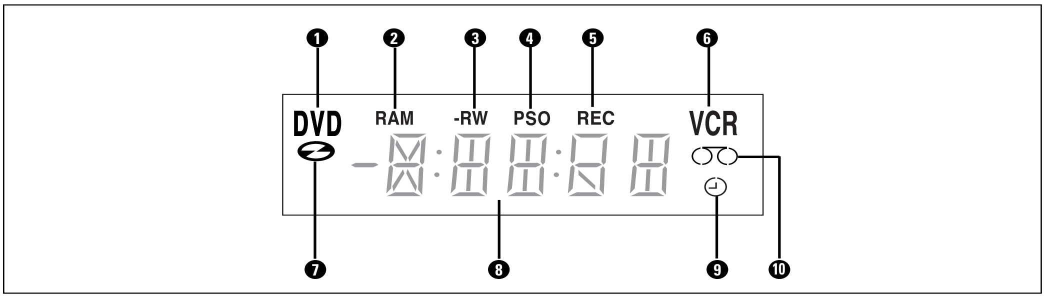
Description

Front Panel


1
2
3
4
SAMSUNG
OPEN/CLOSE
EJECT
POWER
P.SCAN
AV IN 2
VIDEO
AUDIO
DV INPUT
DVD/VCR
REC
CH
DVD
COPY
VCR
5
6
7
8
9
10
11
12
13
14
15

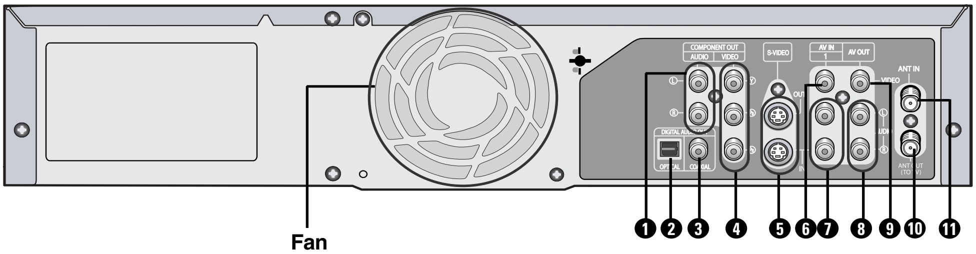
1. DVD DECK
2. DVD OPEN/CLOSE BUTTON
3. VCR DECK
4. VCR EJECT BUTTON
5. POWER BUTTON
6. P.SCAN BUTTON
7. VIDEO INPUT JACK (AV IN 2)
8. AUDIO L, R INPUT JACKS (AV IN 2)
9. DV INPUT JACK
10. FRONT PANEL DISPLAY
11. DVD/VCR SELECT BUTTON
12. RECORD BUTTON
13. CHANNEL ∧/ ∨ BUTTONS
14. COPY BUTTON
15. PLAY/STILL, REW/SKIP, F.F/SKIP, STOP, BUTTONS

Front Panel Display


1
2
3
4
5
6
DVD
RAM
-RW
PSO
REC
VCR
7
8
9
10

1. DVD is activated.
2. DVD-RAM is activated.
3. DVD-R or DVD-RW is activated.
4. Progressive Scan mode is activated.
5. Record function is activated.
6. VCR is activated.
7. DVD or CD media is loaded.
8. The time, counter position or current deck status is indicated.
9. When you set a Timer recording, this indicator is it.
10. VHS Videotape is loaded.

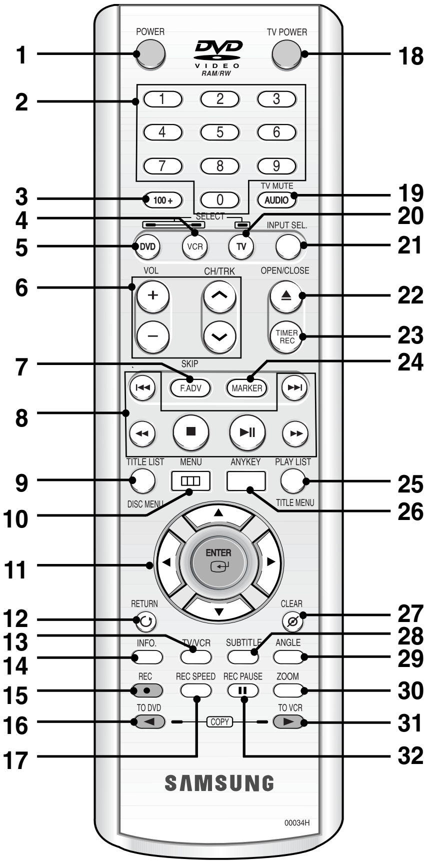
Rear Panel


COMPONENT OUT
AUDIO
VIDEO
L
R
Y
PB
PR
DIGITAL AUDIO OUT
OPTICAL
COAXIAL
S-VIDEO
OUT
IN
AV IN 1
AV OUT
VIDEO
AUDIO
L
R
ANT IN
ANT OUT (TO TV)
1
2
3
4
5
6
7
8
9
10
11

Fan
The fan always revolves when the power is on.
Ensure a minimum of 4” clear space on all sides of the fan when installing the product.

1. AUDIO L, R OUT JACKS (COMPONENT OUT)
2. DIGITAL AUDIO OUT JACK (OPTICAL)
3. DIGITAL AUDIO OUT JACK (COAXIAL)
4. VIDEO OUT JACKS (COMPONENT OUT)
5. S-VIDEO IN/OUT JACKS
6. VIDEO INPUT JACK (AV IN 1)
7. AUDIO L, R INPUT JACKS (AV IN 1)
8. AUDIO L, R OUT JACKS(AV OUT)
9. VIDEO OUT JACK(AV OUT)
10. ANT OUT (TO TV) JACK
11. ANT IN JACK

Tour of the Remote Control


1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
POWER
TV POWER
DVD VIDEO RAM/RW
1
2
3
4
5
6
7
8
9
100+
0
TV MUTE
AUDIO
SELECT
INPUT SEL.
DVD
VCR
TV
VOL
CH/TRK
OPEN/CLOSE
TIMER REC
SKIP
F.ADV
MARKER
TITLE LIST
MENU
ANYKEY
PLAY LIST
DISC MENU
TITLE MENU
ENTER
RETURN
CLEAR
INFO.
TV/VCR
SUBTITLE
ANGLE
REC
REC SPEED
REC PAUSE
ZOOM
TO DVD
TO VCR
COPY
SAMSUNG
00034H

1. POWER Button

2. NUMBER Button

3. 100+ Button
Press this to select channel 100 or higher.

4. VCR Button
Press this when you use a VCR.

5. DVD Button
Press this when you use a DVD.

6. TV Control Buttons
- VOLUME Button
  TV volume adjustment
- CHANNEL Button
  Press this to select a TV channel.
- TRK Button
  Press this to remove the white line.

7. F.ADV/SKIP Button

8. Playback-related Buttons
Forward/Rewind, Search, Skip, Stop, Play/Pause

9. TITLE LIST(DISC MENU) Button
Press this to enter the TITLE list/Disc menu.

10. MENU Button
Press this to bring up the DVD Recorder & VCR's setup menu.

11. ENTER/DIRECTION Buttons
(UP/DOWN or LEFT/RIGHT Buttons)
This button functions as a toggle switch.

12. RETURN Button
Returns to a previous menu.

13. TV/VCR Button

14. INFO Button
Press this to display current setting or disc status.

15. REC Button
Press this to make a recording on VCR, DVD-RAM/-RW/-R discs.

16. DVD COPY Button
Press this when you copy from the VCR to the DVD.

17. REC SPEED Button
Use this to set the desired recording time and picture quality.

18. TV POWER Button

19. AUDIO/TV MUTE Button
Press this to access various audio functions.
This operates as sound mute. (TV mode)

20. TV Button
Press this to operate TV.

21. INPUT SEL. Button
Press this to select AV input signal in external input mode.(Tuner, AV input, DV input)

22. OPEN/CLOSE Button
Press this to open and close the disc tray.

23. TIMER REC Button
Press this when you use Timer Recording.

24. MARKER Button
Press this to bookmark or mark a position while playing a disc.

25. PLAY LIST(TITLE MENU) Button
Press this to enter the Edit playlist/Title menu.

26. ANYKEY Button
Press this to view the status of the disc that is being played.

27. CLEAR Button

28. SUBTITLE Button
Press this to switch the DVD's subtitle language.

29. ANGLE Button
Press this to access various camera angles on a disc (if the disc contains multiple camera angles).

30. ZOOM Button
Zooms in on screen.

31. VCR COPY Button
Press this when you copy from the DVD to the VCR.

32. REC PAUSE Button
Press this to pause during recording.

Key Lock Function

If you do not want others to operate the DVD Recorder & VCR (for example if you have programmed a timer recording) you can set the equipment to lock out all button controls.

- Press and hold the **INFO.** button on the remote control for 5 seconds.
  The display will show "SAFE" when the feature is activated.
- To resume normal mode, press and hold the **INFO.** button again for 5 seconds.
  "SAFE" will disappear and the DVD Recorder & VCR will operate normally.

Connections

Connecting & Setting Up

Quick Overview 14
Step 1 : Unpacking 15
Step 2 : Connecting the Antenna cable 15
Step 3 : Connecting the Video cable 16
Step 4 : Connecting the Audio cable 18
Step 5 : Connecting External Devices 19
Step 6 : Connecting the Power Cord 20
Step 7 : Preparing the Remote Control 20

Quick Overview

A Quick overview presented in this guide will give you enough information to start using the recorder.

Step 1 : Unpacking

▼

Step 2 : Connecting the Antenna Cable

▼

Step 3 : Connecting the Video Cable

▼

Step 4 : Connecting the Audio Cable

▼

Step 5 : Connecting External Devices

▼

Step 6 : Connecting the Power Cord

▼

Step 7 : Preparing the Remote Control

- **Note to CATV system installer :** This reminder is to call CATV system installer's attention to Article 820-40 of the National Electrical Code (Section 54 of Canadian Electrical Code, Part I), that provides guidelines for proper grounding and, in particular, specifies that the cable ground shall be connected to the grounding system of the building as close to the point of cable title as practical.

Step 1: Unpacking

Accessories

Check for the supplied accessories below.
- Video/Audio Cable (AC39-00073A)
- RF Cable for TV (AC39-42001J)
- Remote Control (AK59-00034H)
- Batteries for Remote Control (AAA Size) (AC43-12002H)
- User's Manual
- Quick Guide

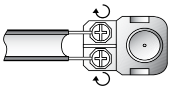
Step 2: Connecting the Antenna Cable

There are several ways to connect your DVD Recorder & VCR. Select one of the following antenna connections that best suits you below.

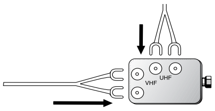
- **Method 1** : Antenna + DVD Recorder & VCR + TV : No Cable box
- **Method 2** : Antenna +Cable box + DVD Recorder & VCR + TV : Cable box with many scrambled channels
- **Method 3** : Antenna + DVD Recorder & VCR + Cable box + TV : Cable box with a few scrambled channels

Note

- If you are using an off-air antenna that has 300-ohm twin flat leads, use an external antenna connector (300-75 ohm adaptor : not supplied) to connect the antenna to the DVD Recorder & VCR.

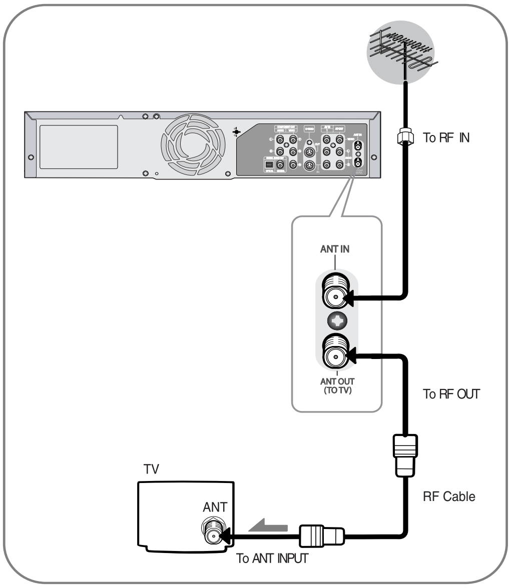


- If you have two separate antennas (one VHF and the other UHF), use a UHF/VHF combiner-adaptor (available at most electronics shops) to connect the antenna to the DVD Recorder & VCR.



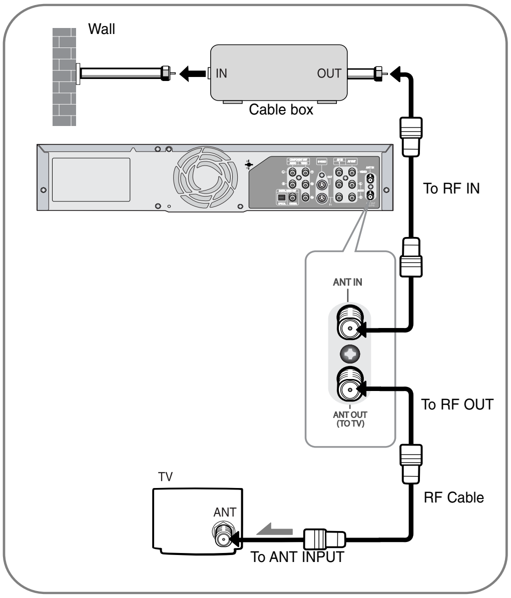
Method1 : Antenna + DVD Recorder & VCR + TV : No Cable box

You can record non-scrambled channels by selecting the channel on the DVD Recorder & VCR. Also use this Method if you watch channels without a cable box.



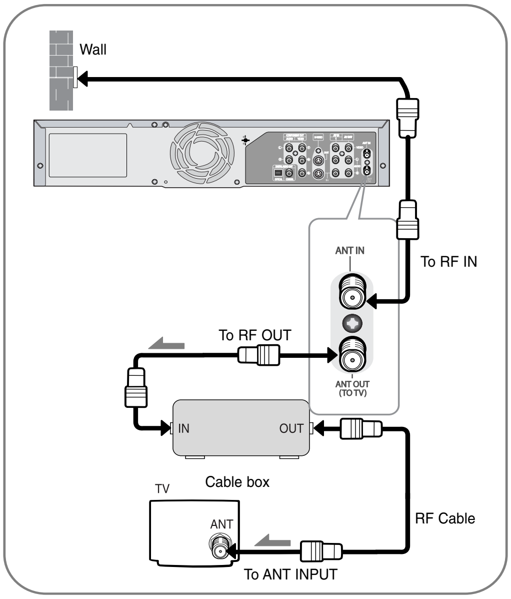
Method 2 : Antenna +Cable box + DVD Recorder & VCR + TV : Cable box with many scrambled channels

You can record channels by selecting the channel on the cable box. You cannot record one channel while watching another channel. Be sure that the cable box is turned on.



Method 3 : Antenna + DVD Recorder & VCR + Cable box +TV : Cable box with a few scrambled channels

You can record non-scrambled channels by selecting the channel on the cable box. You cannot record scrambled channels that require a cable box.



Step 3: Connecting the Video Cable

There are several ways to connect your DVD Recorder & VCR. Select one of the following video connecting methods that best suits you below.

- **Method 1** : Connecting to a Video input jack
- **Method 2** : Connecting to an S-video input jack
- **Method 3** : Connecting to Component video input jacks (Y, PB, PR)

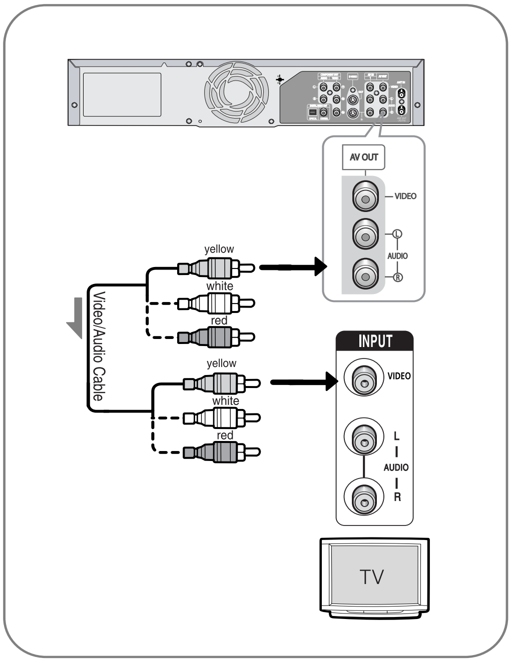
S-Video, Component video and Progressive Output Modes

- S-Video and Component video output are available only if your TV supports S-Video input or Component video input, respectively. If S-Video or Component video output does not work, check the TV connections and the TV input selection settings.
- Compared to standard interlaced video, progressive scan doubles the amount of video lines fed to your TV, resulting in a more stable, flicker-free, and clear image than interlaced video. The progressive scan video output jack is used in progressive output mode. This is only available with TVs that support progressive scan.
- Consumers should note that not all high definition television sets are fully compatible with this product and may cause artifacts to be displayed in the picture. If you experience 480 progressive scan picture problems, it is recommended that you switch the connection to the 'standard definition' output. If there are questions regarding TV set compatibility with this model, please contact our customer service center at 1-800-SAMSUNG.

Method 1 : Connecting to a video input jack

Connect a video(yellow) cable between the VIDEO OUT jack (AV OUT) on DVD Recorder & VCR and VIDEO (yellow) IN jack on the TV(or AV amplifier).

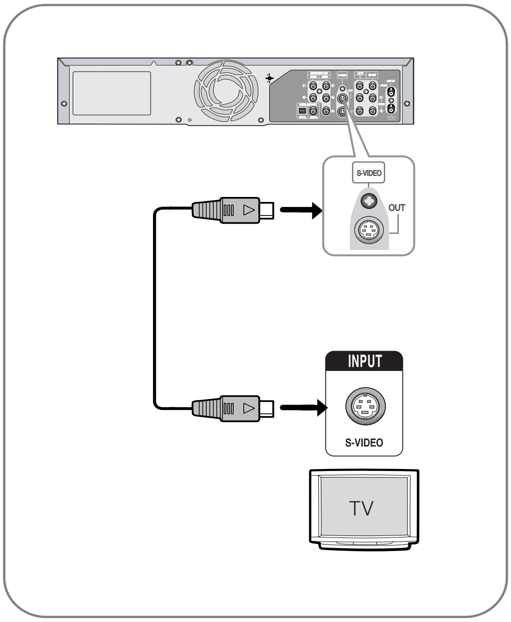
- You will enjoy regular quality images.
- Connect audio cables (white and red) between the AUDIO L, R OUT Jacks (AV OUT) on the DVD Recorder & VCR and AUDIO IN jacks on TV (or AV amplifier).



Method 2 : Connecting to an S-video input jack

Connect an S-video cable(not included) between the S-VIDEO OUT jack on DVD Recorder & VCR and S-VIDEO IN jack on your TV (or AV amplifier).

- You will enjoy high quality images. S-Video separates the picture element into black and white (Y) and color (C) signals to present clearer images than regular video input mode.
- Connect audio cables(white and red) between the AUDIO L, R OUT Jacks (AV OUT) on the DVD Recorder & VCR and AUDIO IN jacks on TV(or AV amplifier). (See pages 18 to 19)

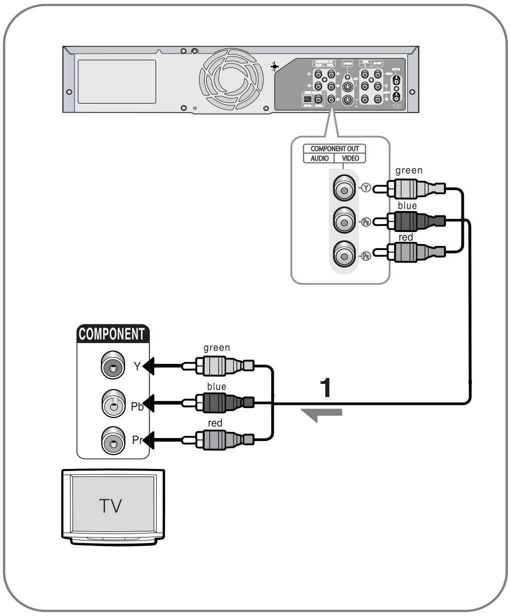


Method 3 : Connecting to Component video input jacks(Y,PB,PR)

Your TV must support progressive scan input to allow you to watch progressive scan component video output.

1. Connect Component video cables(not included) between the VIDEO OUT jacks (COMPONENT OUT) on DVD Recorder & VCR and COMPONENT VIDEO IN jacks on your TV (or AV amplifier).

2. Press the **P.SCAN** button on the front panel while the unit is in Stop mode. The message [Press “Yes” to confirm Progressive scan mode. Otherwise press “No”.] will be displayed.
   Press the ◄ ► buttons to select Yes, and then press the **ENTER** button. Make sure that the disc has stopped completely before changing the mode.



- You will enjoy high quality accurate color reproduction images. Component video separates the picture element into black and White(Y), blue(PB), red(PR) signals to present most clear and clean images.

Note

- ■ Make sure that the color coded connections match. That is, the Y, PB and PR component output jacks of your DVD Recorder & VCR should be connected to the exact corresponding component input jacks on your TV. Otherwise, red or blue images will be displayed on the TV screen.
- ■ Make sure that the left and right audio output jacks of your DVD Recorder & VCR are connected to the left and right audio input jacks of your TV, respectively.(page 18)

Step 4 : Connecting the Audio Cable

There are several ways to connect your DVD Recorder & VCR. Select the audio connection that best suits you below.

- **Method 1** : Connecting to your TV
- **Method 2** : Connecting to a stereo amplifier (analog audio out)
- **Method 3** : Connecting to an AV amplifier with a digital input jack.

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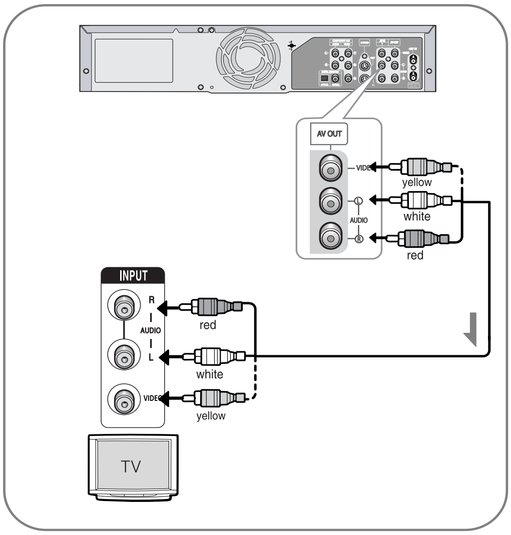
“DTS” and “DTS Digital Out” are trademarks of Digital Theater Systems, Inc.

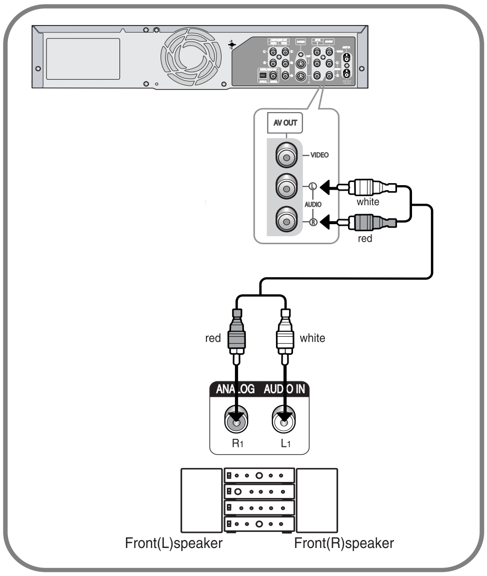
Method 1 : Connecting to your TV

If your TV has audio input jacks, use this connection.


AV OUT
VIDEO
AUDIO
yellow
white
red
INPUT
R
AUDIO
L
VIDEO
red
white
yellow
TV

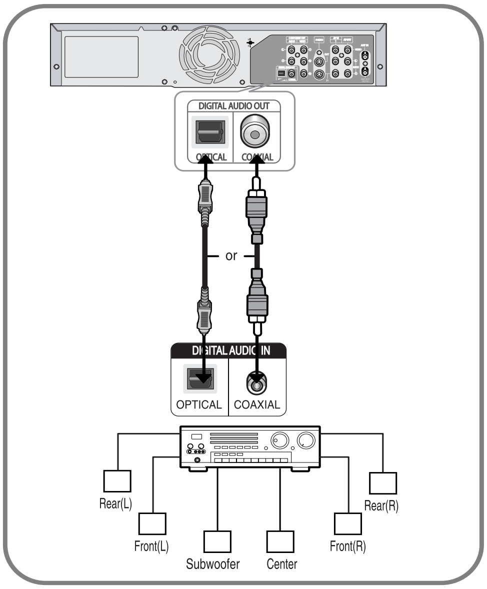
Method 2 : Connecting to a stereo amplifier with analog input jacks

If your stereo amplifier only has audio input jacks (L and R), use the analog audio out jacks on the DVD Recorder & VCR.


AV OUT
VIDEO
AUDIO
white
red
red
white
ANALOG AUDIO IN
R1
L1
Front(L)speaker
Front(R)speaker

Method 3 : Connecting to an AV amplifier with the digital input jack

If your AV amplifier has a Dolby Digital or DTS decoder and a digital input jack, use this connection. To enjoy Dolby Digital or DTS sound, you will need to set up the audio settings. (See page 28)


DIGITAL AUDIO OUT
OPTICAL
COAXIAL
or
DIGITAL AUDIO IN
OPTICAL
COAXIAL
Rear(L)
Rear(R)
Front(L)
Front(R)
Subwoofer
Center

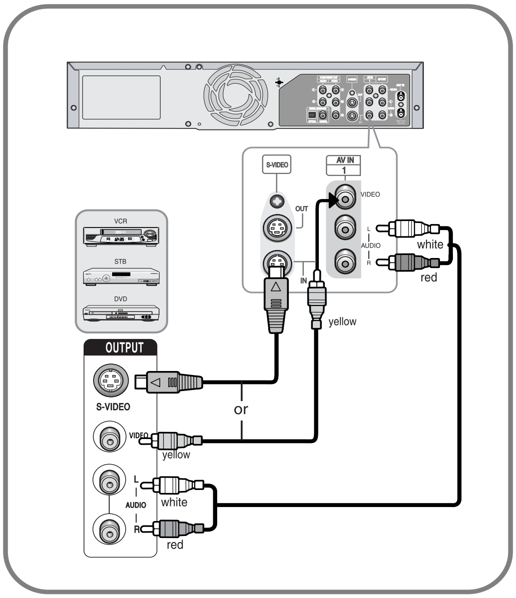
Step 5 : Connecting External Devices

This allows you to connect your DVD Recorder & VCR to other external devices and view or record their outputs.

- **Method 1** : Connecting a VCR, Set-Top Box(STB) or DVD player to the AUDIO/VIDEO AV IN 1 jacks.
- **Method 2** : Connecting a Camcorder to the AV IN 2 in jacks.
- **Method 3** : Connecting a Camcorder to the DV IN jack.

Method 1 : Connecting a VCR, Settop Box(STB) or DVD player to the AUDIO/VIDEO AV IN 1 jacks

Connecting a VCR or external device to AV IN 1 jacks of the DVD Recorder & VCR.
You can record from connected equipment (VCR, STB or DVD).

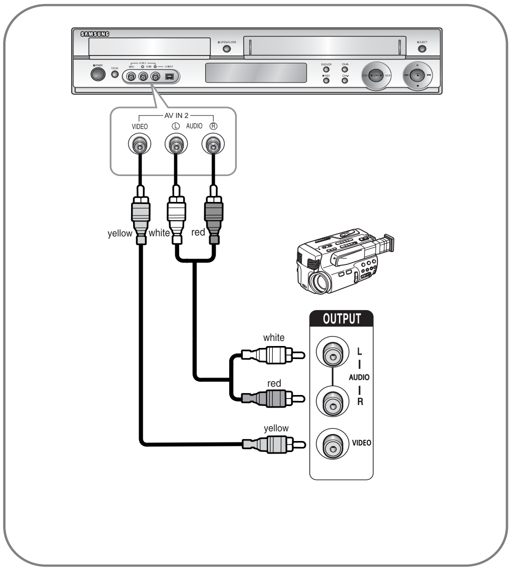

S-VIDEO
AV IN 1
VIDEO
OUT
IN
L
AUDIO
R
white
red
yellow
VCR
STB
DVD
OUTPUT
S-VIDEO
VIDEO
yellow
L
AUDIO
R
white
red
or

Note

- ■ You can also use the AV IN 2 jacks on the front panel of the DVD Recorder & VCR.
- ■ When the S-Video jack and Video jack are both connected, the S-Video jack will have priority. Line Selection will be automatically done.
- ■ Copy protected content cannot be recorded.

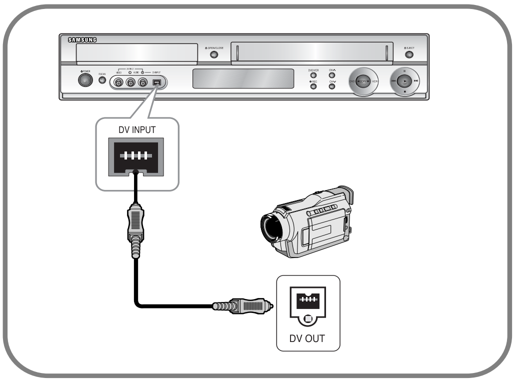
Method 2 : Connecting a Camcorder to the AV IN 2 jacks

You can use the AV IN 2 jacks on the front panel of the DVD Recorder & VCR. You can record from connected as a camcorder.
When an input source is inserted into AV IN 2 while viewing TV, the input will be switched to AV IN 2 automatically.


AV IN 2
VIDEO
L
AUDIO
R
yellow
white
red
OUTPUT
white
red
yellow
L
AUDIO
R
VIDEO

Method 3 : Connecting a Camcorder to the DV IN jack

If your camcorder has a DV output jack, connect it to the DV input jack of your DVD Recorder & VCR.

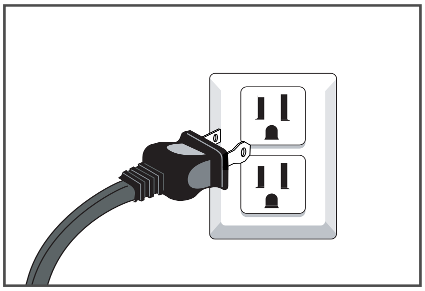

DV INPUT
DV OUT

Step 6 : Connecting the Power Cord

After all connections are complete, plug the power cord in the wall outlet.

"Auto" appears in the front panel display. This means that the current time is being set automatically through the antenna under connection(Auto Program). The setup may take several minutes.

When the DVD Recorder & VCR operates normally, the current time is automatically set and displayed in the front panel display.



Step 7 : Preparing the Remote Control

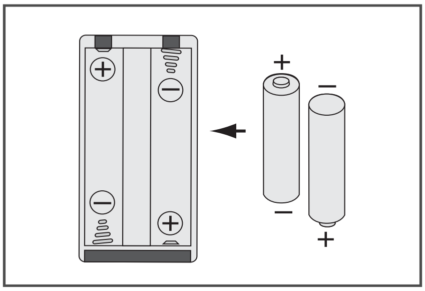
Install Batteries in the Remote Control

- Open the battery cover on the back of the remote control.
- Insert two AAA batteries. Make sure that the polarities (+ and -) are aligned correctly.
- Replace the battery cover.

If the remote control does not operate properly:

- Check the polarity + - of the batteries (Dry-Cell)
- Check if the batteries are drained.
- Check if the remote sensor is blocked by obstacles.
- Check if there is any fluorescent lighting nearby.

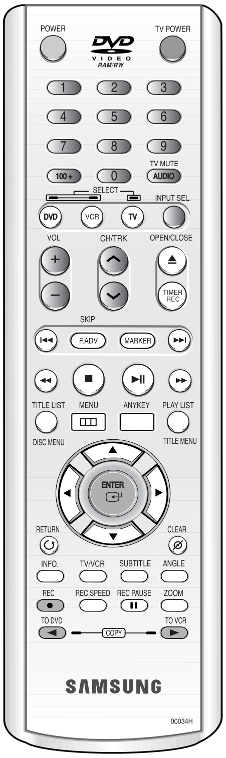
Dispose of batteries according to local environmental regulations. Do not put them in the household trash.



Setting the Remote Control

You can control part of another manufacturer’s TV functions with this remote control.

- Control function buttons involve : TV POWER, CH/TRK (∧/∨), VOL +/−, Direct number buttons, TV MUTE, INPUT SEL.


POWER
TV POWER
DVD VIDEO RAM/RW
1
2
3
4
5
6
7
8
9
TV MUTE
100+
0
AUDIO
SELECT
INPUT SEL.
DVD
VCR
TV
VOL
CH/TRK
OPEN/CLOSE
TIMER REC
SKIP
F.ADV
MARKER
TITLE LIST
MENU
ANYKEY
PLAY LIST
DISC MENU
TITLE MENU
ENTER
RETURN
CLEAR
INFO.
TV/VCR
SUBTITLE
ANGLE
REC
REC SPEED
REC PAUSE
ZOOM
TO DVD
TO VCR
COPY
SAMSUNG
00034H

To determine whether your television is compatible, follow the instructions below.

1. Switch your television on.
2. Point the remote control towards the television.
3. Press the TV button and enter the two-figure code corresponding to the brand of your television, by pressing the appropriate number button.

Brand	Codes	Brand	Codes
SAMSUNG	01,14,15,23,31	NEWSAN	27
DAEWOO	19	NOBLEX	25
EMERSON	21	PANASONIC	12,24
GRADIENTE	30	RCA	07,29
HITACHI	10	SANYO	05,20
JVC	11	SHARP	02,16,22
LG	06,08,18	SONY	03
LOEWE	28	TELEFUNKEN	26
MAGNAVOX	04	TOSHIBA	09
MITSUBISHI	13	ZENITH	17

Result: If your television is compatible with the remote control, it will switch off.
It is now programmed to operate with the remote control.

Note

- ■ If several codes are indicated for your television brand, try each one in turn until you find one that works. If you replace the remote control’s batteries, you must set the brand code again.

You can then control the television using the following buttons.

Button	Function
TV POWER	Used to switch the television on and off.
INPUT SEL.	Used to select an external source.
VOL +/−	Used to adjust the volume of the television.
CH/TRK (∧/∨)	Used to select the desired channel.
TV MUTE	Used to toggle the sound on and off.
0~9	Used to input number directly.
100+	Used to select channels over 100.

Note

- ■ The various functions may not necessarily work on all televisions. If you encounter problems, operate the television directly.

System Setup

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Channel Set 25

Auto Channel Memory..25

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Setting Up the Audio Options 28

Setting Up the Display (Video) Options 29

Setting Up the Parental Control 30

VCR Setting 31

Video Input 32

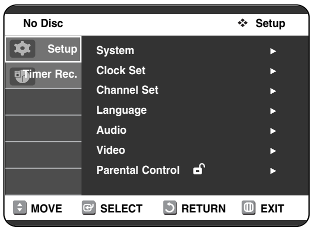
Front Display 33

DVD EP Mode Time 33

Automatic Chapter Creator 34

On-Screen Menu Navigation

The on-screen menus allow you to enable or disable various functions on your DVD Recorder & VCR.
Use the following buttons to open and navigate through the on-screen menus.


No Disc
Setup
Setup
Timer Rec.
System ►
Clock Set ►
Channel Set ►
Language ►
Audio ►
Video ►
Parental Control ►
MOVE
SELECT
RETURN
EXIT

1 **MENU Button**
Press this button on the remote control to open the on-screen **MENU**. Press again to exit the on-screen **MENU**.

2 **▲/▼,◄ /► Buttons**
Press these buttons on the remote control to move the selection bar ▲/▼,◄ /► to cycle through the menu options.

3 **ENTER Button**
Press this button on the remote control to confirm any new settings.

4 **RETURN Button**
Press this button on the remote control to return to the previous **MENU** screen displayed or to exit the on-screen **MENU**.

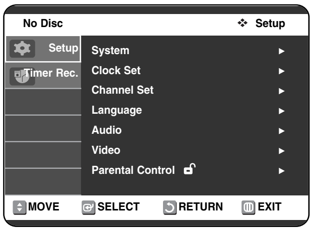
Auto Clock Set

This menu is used to set the current time. You need to set the time to use timer recording.

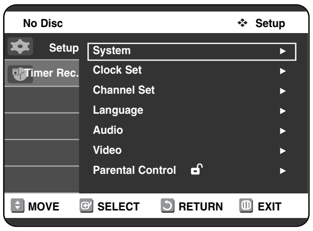
Note

- You must have the antenna connected to set the Auto Clock. See pages 15~16 for Antenna Connections.
- The Clock will be automatically set when you turn off the recorder.

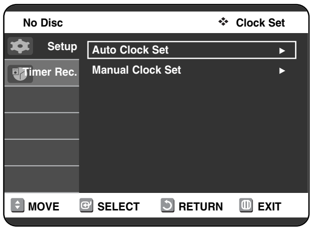
1 With the unit in Stop mode/No Disc mode, press the **MENU** button.


No Disc
Setup
Setup
Timer Rec.
System
Clock Set
Channel Set
Language
Audio
Video
Parental Control
MOVE
SELECT
RETURN
EXIT

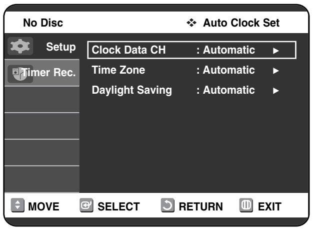
2 Press the ▲▼ buttons to select **Setup**, then press the **ENTER** or ▶ button.


No Disc
Setup
Setup
Timer Rec.
System
Clock Set
Channel Set
Language
Audio
Video
Parental Control
MOVE
SELECT
RETURN
EXIT

3 Press the ▲▼ buttons to select **Clock Set**, then press the **ENTER** or ▶ button.


No Disc
Clock Set
Setup
Timer Rec.
Auto Clock Set
Manual Clock Set
MOVE
SELECT
RETURN
EXIT

4 Press the ▲▼ buttons to select **Auto Clock Set**, then press the **ENTER** or ▶ button.


No Disc
Auto Clock Set
Setup
Timer Rec.
MOVE
SELECT
RETURN
EXIT

Clock Data CH : Automatic
Time Zone : Automatic
Daylight Saving : Automatic

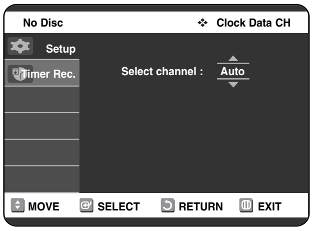
Note

- If your clock is set to the wrong time zone or daylight saving, you can adjust these settings without turning off the Auto Clock Set function.

5 Press the ▲▼ buttons to select the sub menu (Clock Data CH, Time Zone or Daylight Saving), then press the **ENTER** or ▶ button.

Clock Data CH

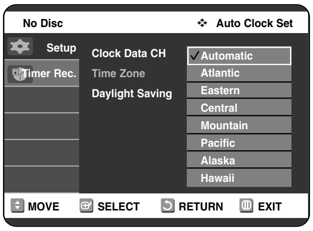
Press the ▲▼ buttons to select a channel that carries a time signal, then press the **ENTER** button. Select Auto to set the channel automatically.


No Disc
Clock Data CH
Setup
Timer Rec.
MOVE
SELECT
RETURN
EXIT

Select channel : Auto

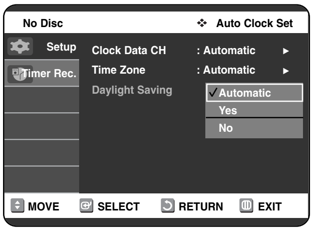
Time Zone

Press the ▲▼ buttons to select the time zone of your area, then press the **ENTER** or ▶ button. Select Automatic to set the time zone automatically.


No Disc
Auto Clock Set
Setup
Timer Rec.
Clock Data CH
Time Zone
Daylight Saving
✓Automatic
Atlantic
Eastern
Central
Mountain
Pacific
Alaska
Hawaii
MOVE
SELECT
RETURN
EXIT

Daylight Saving

Press the ▲▼ buttons to select **Automatic**, **Yes** or **No**, then press the **ENTER** or ▶ button. Select Automatic to set the daylight saving automatically.


No Disc
Auto Clock Set
Setup
Timer Rec.
MOVE
SELECT
RETURN
EXIT

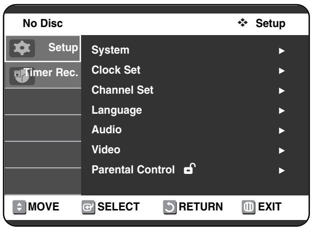
Clock Data CH : Automatic ▸
Time Zone : Automatic ▸
Daylight Saving ✓Automatic
Yes
No

Manual Clock Set

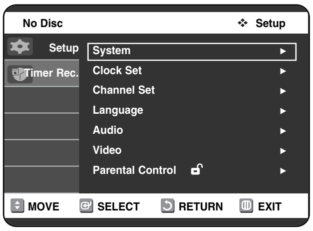
If Auto Setup fails to set the DVD Recorder & VCR's internal clock by locating a local TV station, follow these steps to set the date and time manually.

Note For accurate Timer Recording, your DVD Recorder & VCR's internal clock must be set correctly.

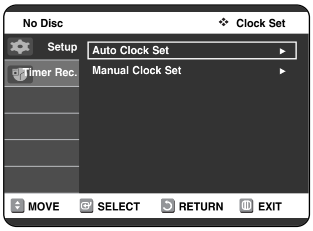
1 With the unit in Stop mode/No Disc mode, press the **MENU** button.


No Disc
Setup
Setup
Timer Rec.
System ▸
Clock Set ▸
Channel Set ▸
Language ▸
Audio ▸
Video ▸
Parental Control ▸
MOVE
SELECT
RETURN
EXIT

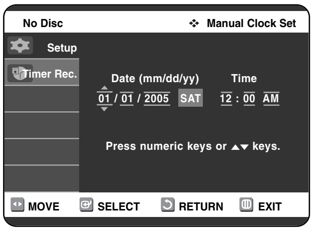
2 Press the ▲▼ buttons to select **Setup**, then press the **ENTER** or ▶ button.


No Disc
Setup
Setup
Timer Rec.
System ▸
Clock Set ▸
Channel Set ▸
Language ▸
Audio ▸
Video ▸
Parental Control ▸
MOVE
SELECT
RETURN
EXIT

3 Press the ▲▼ buttons to select **Clock Set**, then press the **ENTER** or ▶ button.


No Disc
Clock Set
Setup
Timer Rec.
Auto Clock Set ▸
Manual Clock Set ▸
MOVE
SELECT
RETURN
EXIT

4 Press the ▲▼ buttons to select **Manual Clock Set**, then press the **ENTER** or ▶ button.


No Disc
Manual Clock Set
Setup
Timer Rec.
MOVE
SELECT
RETURN
EXIT

Date (mm/dd/yy) Time
01 / 01 / 2005 SAT 12 : 00 AM
Press numeric keys or ▲▼ keys.

5 Press the ▲▼◀ ▶ buttons to select the Current Date and Current Time, then press the **ENTER** button. When the current time is stored in memory and then the set is powered off, the current time will appear in the front panel display.

▲▼ : Sets the value

You can set the value using the number (0~9) buttons.

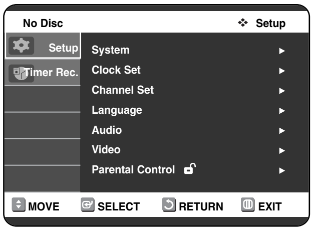
◀ ▶: Moves to items

Channel Set

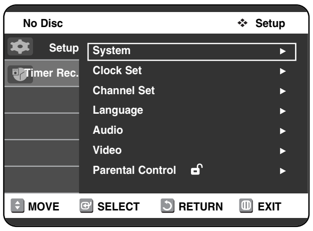
This feature allows you to manually set the DVD Recorder & VCR's tuner band to Antenna or Cable, whichever you connected to the Antenna In jack during initial setup.

- Use this setting only if Auto Setup detected the incorrect tuner band, i.e. channels are coming in on the wrong channel numbers.

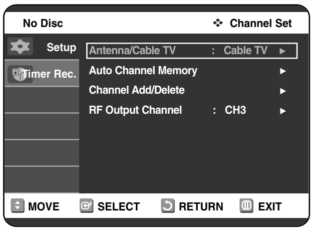
1 With the unit in Stop mode/No Disc mode, press the **MENU** button.


No Disc
Setup
Setup
Timer Rec.
System
Clock Set
Channel Set
Language
Audio
Video
Parental Control
MOVE
SELECT
RETURN
EXIT

2 Press the ▲▼ buttons to select **Setup**, then press the **ENTER** or ▶ button.


No Disc
Setup
Setup
Timer Rec.
System
Clock Set
Channel Set
Language
Audio
Video
Parental Control
MOVE
SELECT
RETURN
EXIT

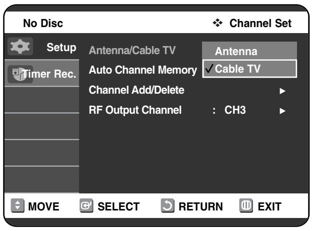
3 Press the ▲▼ buttons to select **Channel Set**, then press **ENTER** or ▶ button.


No Disc
Channel Set
Setup
Timer Rec.
Auto Channel Memory
Channel Add/Delete
MOVE
SELECT
RETURN
EXIT

Antenna/Cable TV : Cable TV

RF Output Channel : CH3

4 Press the ▲▼ buttons to select **Antenna/Cable TV**, then press the **ENTER** or ▶ button.


No Disc
Channel Set
Setup
Timer Rec.
Antenna/Cable TV
Auto Channel Memory
Channel Add/Delete
Antenna
✓Cable TV
MOVE
SELECT
RETURN
EXIT

RF Output Channel : CH3

Select the Antenna/Cable TV(Signal Source) that matches the antenna connection you selected on pages 15~16(method1, 2 and 3).

- Antenna - Select if the DVD Recorder & VCR is connected to an indoor or outdoor VHF/UHF Antenna(method1 and 3).
- Cable TV - Select if the DVD Recorder & VCR is connected to Cable TV(method 2).

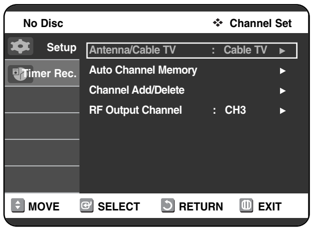
Auto Channel Memory

Auto Channel Memory will automatically seek and store all active channels in your area.

1 With the unit in Stop mode/No Disc mode, press the **MENU** button.

2 Press the ▲▼ buttons to select **Setup**, then press the **ENTER** or ▶ button.

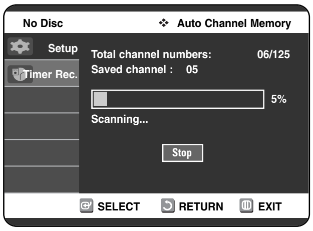
3 Press the ▲▼ buttons to select **Channel Set**, then press the **ENTER** or ▶ button.


No Disc
Channel Set
Setup
Timer Rec.
Auto Channel Memory
Channel Add/Delete
MOVE
SELECT
RETURN
EXIT

Antenna/Cable TV : Cable TV

RF Output Channel : CH3

4 Press the ▲▼ buttons to select **Auto Channel Memory**, then press the **ENTER** or ▶ button.


No Disc
Auto Channel Memory
Setup
Timer Rec.
Stop
SELECT
RETURN
EXIT

Total channel numbers: 06/125
Saved channel : 05
5%
Scanning...

- The DVD Recorder & VCR will automatically search for all available channels in the selected tuner band. This procedure may take a few minutes to complete.
- When finished, the lowest channel found will be displayed.
- Press **ENTER** button to stop or cancel scanning.

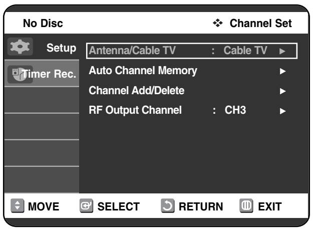
Channel Add/Delete

Use this feature if Auto Channel Memory missed a channel that you would like to add and delete a channel you wish to remove.

1 With the unit in Stop mode/No Disc mode, press the **MENU** button.

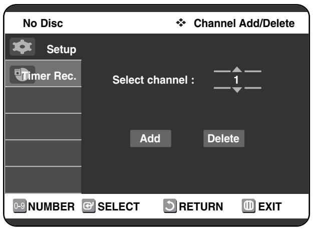
2 Press the ▲▼ buttons to select **Setup**, then press the **ENTER** or ▶ button.

3 Press the ▲▼ buttons to select **Channel Set**, then press the **ENTER** or ▶ button.


No Disc
Channel Set
Setup
Timer Rec.
MOVE
SELECT
RETURN
EXIT

Antenna/Cable TV : Cable TV ▶
Auto Channel Memory ▶
Channel Add/Delete ▶
RF Output Channel : CH3 ▶

4 Press the ▲▼ buttons to select **Channel Add/Delete**, then press the **ENTER** or ▶ button.

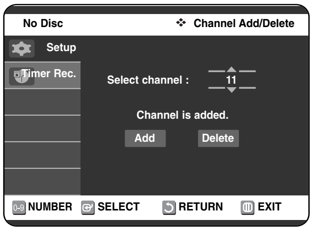

No Disc
Channel Add/Delete
Setup
Timer Rec.
Add
Delete
NUMBER
SELECT
RETURN
EXIT

Select channel : 1

5 Press the ▲▼ or number buttons to select the channels you want to add or delete on the Select channel screen. Then, press the **ENTER** button.

- Using ▲▼ buttons for channel selection allows the user to add/delete one channel at a time.
- Using **CH/TRK** (∧/∨) buttons for channel selection jumps to the next channel memorized in Auto Channel Memory.

6 Press the ◀▶ buttons to select **Add** or **Delete**, then press the **ENTER** button.


No Disc
Channel Add/Delete
Setup
Timer Rec.
Add
Delete
NUMBER
SELECT
RETURN
EXIT

Select channel : 11
Channel is added.

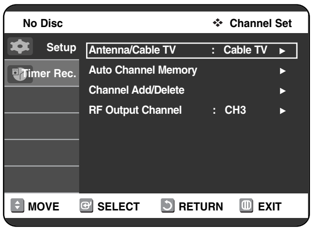
RF Output Channel

When you connect the DVD Recorder & VCR to TV with RF Antenna Cable, follow the steps below to set the RF Output Channel.

1 With the unit in Stop mode/No Disc mode, press the **MENU** button.

2 Press the ▲▼ buttons to select **Setup**, then press the **ENTER** or ▶ button.

3 Press the ▲▼ buttons to select **Channel Set**, then press **ENTER** or ▶ button.

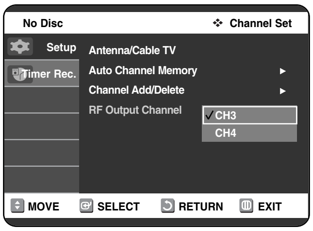

No Disc
Channel Set
Setup
Timer Rec.
Auto Channel Memory
Channel Add/Delete
MOVE
SELECT
RETURN
EXIT

Antenna/Cable TV : Cable TV

RF Output Channel : CH3

---

4 Press the ▲▼ buttons to select **RF Output Channel**, then press the **ENTER** or ▶ button.


No Disc
Channel Set
Setup
Timer Rec.
Antenna/Cable TV
Auto Channel Memory
Channel Add/Delete
RF Output Channel
✓CH3
CH4
MOVE
SELECT
RETURN
EXIT

---

5 Press the ▲▼ buttons to select **CH3/CH4**, then press the **ENTER** or ▶ button.

---

6 A message will appear on your TV.
When the message disappears, change your TV to channel 3 or 4 to match the RF Output Channel of the player.

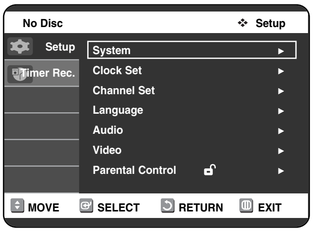
Setting Up the Language Options

If you set audio, subtitle, disc menu and on-screen menu language in advance, they will come up automatically every time you watch a movie.
If the selected language is not recorded on the disc, the original pre-recorded language is selected.

1 With the unit in Stop mode/No Disc mode, press the **MENU** button.

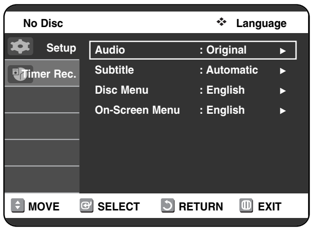
---

2 Press the ▲▼ buttons to select **Setup**, then press the **ENTER** or ▶ button.


No Disc
Setup
Setup
Timer Rec.
System
Clock Set
Channel Set
Language
Audio
Video
Parental Control
MOVE
SELECT
RETURN
EXIT

---

3 Press the ▲▼ buttons to select **Language**, then press the **ENTER** or ▶ button.
Language setup menu will be displayed.


No Disc
Language
Setup
Timer Rec.
MOVE
SELECT
RETURN
EXIT

Audio : Original

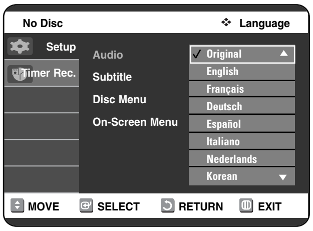
Subtitle : Automatic

Disc Menu : English

On-Screen Menu : English

---

4 Press the ▲▼ buttons to select the desired language option, press the **ENTER** or ▶ button.


No Disc
Language
Setup
Timer Rec.
Audio
Subtitle
Disc Menu
On-Screen Menu
✓ Original
English
Français
Deutsch
Español
Italiano
Nederlands
Korean
MOVE
SELECT
RETURN
EXIT

- **Audio** : For the disc audio language.
- **Subtitle** : For the disc subtitles.
- **Disc Menu**: For the disc menu contained on the disc.
- **On-Screen Menu**: For the on-screen menu of your DVD Recorder & VCR.

---

5 Press the ▲▼ buttons to select the desired language, then press the **ENTER** or ▶ button.

Note

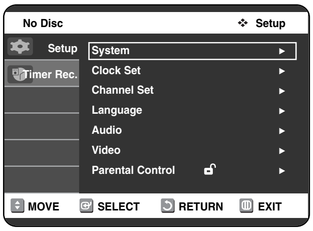
- ■ Press the **RETURN** or ◀ button to return to the previous menu. Press the **MENU** button to exit the menu.
- ■ The selected language will only appear if it is supported on the disc.

Setting Up the Audio Options

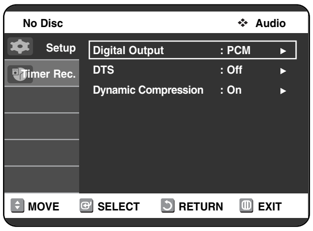
Allows you to setup the audio device and sound staus settings depending on the audio system in use.

1 With the unit in Stop mode/No Disc mode, press the **MENU** button.

2 Press the ▲▼ buttons to select **Setup,** then press the **ENTER** or ▶ button.



3 Press the ▲▼ buttons to select **Audio**, then press the **ENTER** or ▶ button.
Audio setup menu will be displayed.



Digital Output : PCM
DTS : Off
Dynamic Compression : On

4 Press the ▲▼ buttons to select the desired audio option, then press the **ENTER** or ▶ button.

5 Press the ▲▼ buttons to select the desired item, then press the **ENTER** or ▶ button.

Note
- Press the **RETURN** or ◀ button to return to the previous menu.
  Press the **MENU** button to exit the menu.

Digital Output

1. **PCM** : Converts to PCM(2CH) 48kHz audio. Select PCM when using the Analog Audio Outputs.
2. **Bitstream** : Converts to Dolby Digital Bitstream (5.1CH). Select Bitstream when using the Digital Audio Outputs.

Note
- Be sure to select the correct Digital Output or no audio will be heard.

DTS

1. **Off** : Doesn't output digital signal.
2. **On** : Outputs DTS Bitstream via digital output only. Select DTS when connecting to a DTS Decoder.

Note
- When DTS soundtrack is played, sound is not output from Analog Audio Output.

Dynamic Compression

This is only active when a Dolby Digital signal is detected.

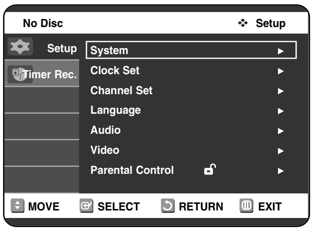
1. **Off** : You can enjoy the movie with the standard Dynamic Range.
2. **On** : When the Movie soundtracks are played at low volume or from smaller speakers, the system can apply appropriate compression to make low-level content more intelligible and prevent dramatic passages from getting too loud.

Setting Up the Display(Video) Options

This function allows you to setup the TV screen settings.

1 With the unit in Stop mode/No Disc mode, press the **MENU** button.

2 Press the ▲▼ buttons to select **Setup**, then press the **ENTER** or ▶ button.



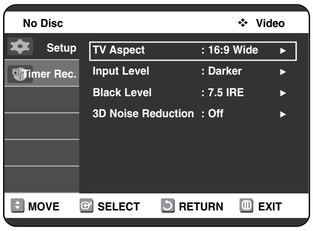
No Disc ❖ Setup

Setup | Timer Rec.

System ▶
Clock Set ▶
Channel Set ▶
Language ▶
Audio ▶
Video ▶
Parental Control ▶

MOVE | SELECT | RETURN | EXIT

3 Press the ▲▼ buttons to select **Video**, then press the **ENTER** or ▶ button.
Video option menu will be displayed.



No Disc ❖ Video

Setup | Timer Rec.

TV Aspect : 16:9 Wide ▶
Input Level : Darker ▶
Black Level : 7.5 IRE ▶
3D Noise Reduction : Off ▶

MOVE | SELECT | RETURN | EXIT

4 Press the ▲▼ buttons to select the desired video option, then press the **ENTER** or ▶ button.

5 Press the ▲▼ buttons to select the desired item, then press the **ENTER** or ▶ button.

Note

- Press the **RETURN** or ◀ button to return to the previous menu. Press the **MENU** button to exit the menu.

TV Aspect

Depending on the type of television you have, you may want to adjust the screen setting. (aspect ratio)

- **4:3 Letter Box** : Select when you want to see the total 16:9 ratio screen DVD supplies, even though you have a TV with a 4:3 ratio screen. Black bars will appear at the top and bottom of the screen.
- **4:3 Pan - Scan** : Select this for a conventional size TV when you want to see the central portion of the 16:9 screen. (Extreme left and right side of movie picture will be cut off.)
- **16:9 Wide** : You can view the full 16:9 picture on your widescreen TV.

Input Level

Adjusts the level of the input signal.

- **Darker :** If you feel the screen is too light and you want to make the sceen darker.
- **Lighter :** If you feel the screen is too dark and you want to make the sceen lighter.

Black Level

Adjusts the black level of the screen.

- **0 IRE** : This is the standard NTSC reference black level for consistent brightness/ contrast across all sources.
  Select this when you want darker screen.
- **7.5 IRE** : This will enhance the black level for increased brightness/contrast when viewing DVDs.
  Select this when you want lighter screen.

3D Noise Reduction

- **Off :** Normal
- **On** : Select to remove noise from the screen.

Note

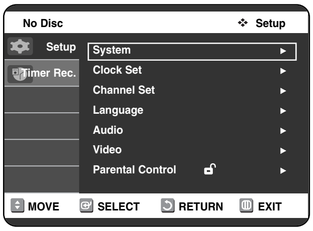
- This function depends on disc type. It may not work for some disc types.
- IRE: Short for the Institute of Radio Engineers. An IRE unit is a relative unit of measure equaling 1/140th of the peak-to peak (p-p) video amplitude.

Setting Up the Parental Control

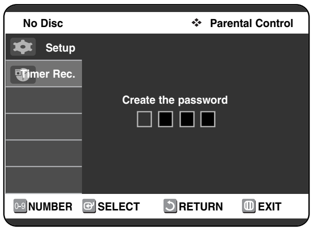
The Parental Control function works in conjunction with DVDs that have been assigned a rating - which helps you control the types of DVDs that your family watches. There are up to 8 rating levels on a disc.

1. With the unit in Stop mode/No Disc mode, press the **MENU** button on the remote control.

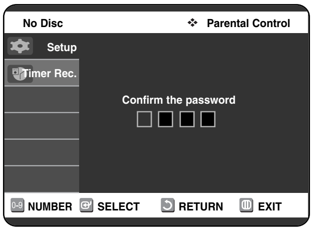
2. Press the ▲▼ buttons to select **Setup**, then press the **ENTER** or ▶ button.


No Disc
Setup
Setup
Timer Rec.
System
Clock Set
Channel Set
Language
Audio
Video
Parental Control
MOVE
SELECT
RETURN
EXIT

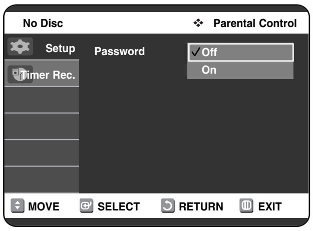
3. Press the ▲▼ buttons to select **Parental Control**, then press the **ENTER** or ▶ button.


No Disc
Parental Control
Setup
Timer Rec.
Create the password
NUMBER
SELECT
RETURN
EXIT

4. Create a 4-digit password using the 0 to 9 buttons on the remote control.


No Disc
Parental Control
Setup
Timer Rec.
Confirm the password
NUMBER
SELECT
RETURN
EXIT

5. The Re-enter Password screen appears to confirm the password. Enter your password again, and then press the **ENTER** or ▶ button.

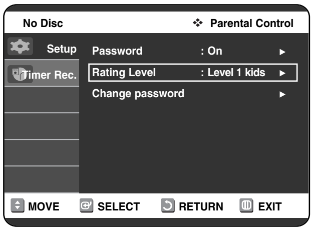

No Disc
Parental Control
Setup
Timer Rec.
Password
✓Off
On
MOVE
SELECT
RETURN
EXIT

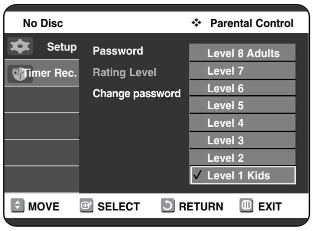
6. Press the ▲▼ buttons to select **On**, then press the **ENTER** or ▶ button.
The Parental Control screen appears.

Note
- Press the **RETURN** or ◀ button to return to the previous menu. Press the **MENU** button to exit the menu.
- Refer to Troubleshooting if you forget your password. (See page 83)

About the Rating Level

1. Press the ▲▼ buttons to select **Rating Level**, then press the **ENTER** or ▶ button.

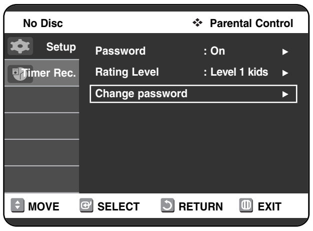

No Disc
Parental Control
Setup
Timer Rec.
Password : On
Rating Level : Level 1 kids
Change password
MOVE
SELECT
RETURN
EXIT


No Disc
Parental Control
Setup
Timer Rec.
Password
Rating Level
Change password
Level 8 Adults
Level 7
Level 6
Level 5
Level 4
Level 3
Level 2
✓Level 1 Kids
MOVE
SELECT
RETURN
EXIT

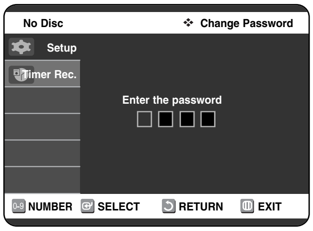
2. Press the ▲▼ buttons to select the rating level you want, then press the **ENTER** or ▶ button.
For example, if you select up to Level 6, discs that contain Level 7, 8 will not play. A larger number indicates that the program is intended for adult use only.

About the Change Password

1 Press the ▲▼ buttons to select **Change Password**, then press the **ENTER** or ▶ button.

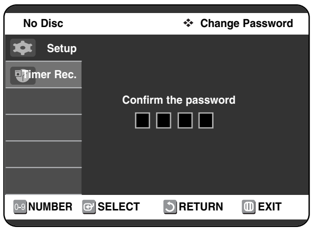

No Disc
Parental Control
Setup
Timer Rec.
MOVE
SELECT
RETURN
EXIT

Password : On ▶
Rating Level : Level 1 kids ▶
Change password ▶


No Disc
Change Password
Setup
Timer Rec.
NUMBER
SELECT
RETURN
EXIT

Enter the password
☐■■■

2 Enter the 4-digit password using the 0 to 9 buttons on the remote control.
The ‘Confirm the password.’ message will be displayed.


No Disc
Change Password
Setup
Timer Rec.
NUMBER
SELECT
RETURN
EXIT

Confirm the password
■■■■

3 Enter your password again using the 0 to 9 buttons on the remote control.

Note

- Press the **RETURN** or ◀ button to return to the previous menu.
Press the **MENU** button to exit the menu.

VCR Setting

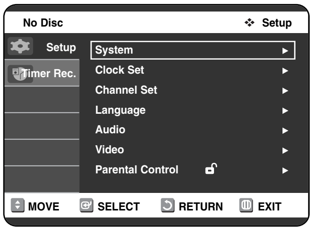
If you want your videotapes to play automatically when you insert them, turn on Auto Play.

Note

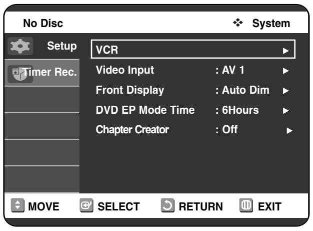
- Only tapes that are missing the Record Safety Tab will play automatically when inserted.

1 With the unit in Stop mode/No Disc mode, press the **MENU** button.

2 Press the ▲▼ buttons to select **Setup**, then press the **ENTER** or ▶ button.

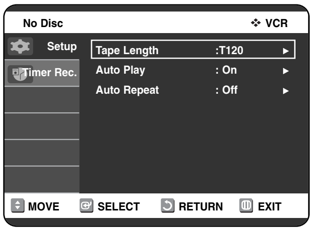

No Disc
Setup
Setup
Timer Rec.
System
Clock Set
Channel Set
Language
Audio
Video
Parental Control
MOVE
SELECT
RETURN
EXIT

3 Press the ▲▼ buttons to select **System**, then press the **ENTER** or ▶ button.


No Disc
System
Setup
Timer Rec.
VCR
MOVE
SELECT
RETURN
EXIT

Video Input : AV 1 ▶
Front Display : Auto Dim ▶
DVD EP Mode Time : 6Hours ▶
Chapter Creator : Off ▶

4 Press the ▲▼ buttons to select **VCR**, then press the **ENTER** or ▶ button.


No Disc
VCR
Setup
Timer Rec.
MOVE
SELECT
RETURN
EXIT

Tape Length :T120 ▶
Auto Play : On ▶
Auto Repeat : Off ▶

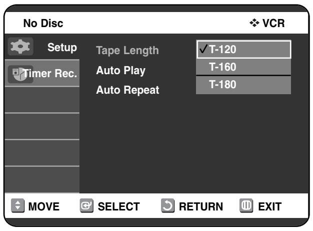
System Setup

5 Press the ▲▼ buttons to select the desired VCR option, then press the **ENTER** or ▶ button.

6 Press the ▲▼ buttons to select the desired item, then press the **ENTER** or ▶ button.

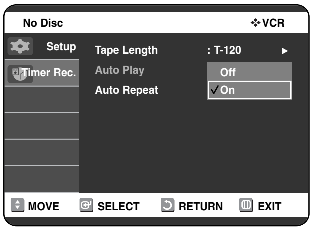
Tape Length

This information is usually printed on the tape box. The menu cycles through: T-120, T-160 or T-180. Once the type of cassette is set, the VCR can display the amount of time remaining on the tape when you press the **INFO.** button.


No Disc
VCR
Setup
Timer Rec.
Tape Length
Auto Play
Auto Repeat
✓T-120
T-160
T-180
MOVE
SELECT
RETURN
EXIT

Auto Play

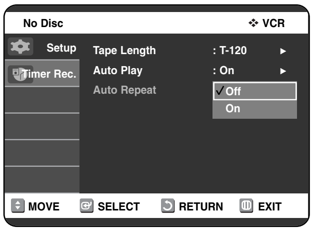
- **Off** - Auto play is disabled.
- **On** - The VCR will automatically begin playing a video tape when it is inserted, as long as the safety tab of the cassette has been removed.


Tape Length : T-120

No Disc
VCR
Setup
Timer Rec.
Auto Play
Auto Repeat
Off
✓On
MOVE
SELECT
RETURN
EXIT

Auto Repeat

It sets the VCR to play a tape repeatedly (unless a tape control is activated :Stop, Fast Forward or Rewind).


Tape Length : T-120
Auto Play : On

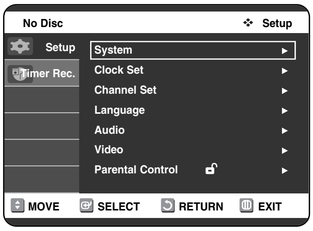
No Disc
VCR
Setup
Timer Rec.
Auto Repeat
✓Off
On
MOVE
SELECT
RETURN
EXIT

Video Input

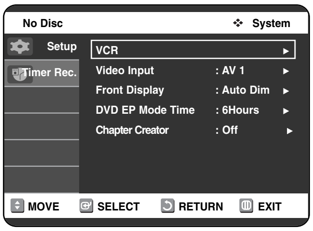
If you watch video through AV IN 1, you can choose AV 1(Composite) or S-video.

1 With the unit in Stop mode/No Disc mode, press the **MENU** button.

2 Press the ▲▼ buttons to select **Setup**, then press the **ENTER** or ▶ button.

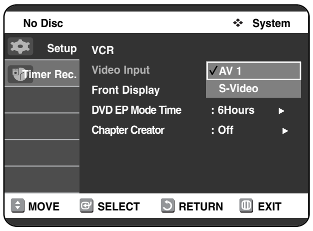

No Disc
Setup
Setup
Timer Rec.
System
Clock Set
Channel Set
Language
Audio
Video
Parental Control
MOVE
SELECT
RETURN
EXIT

3 Press the ▲▼ buttons to select **System**, then press the **ENTER** or ▶ button.


Video Input : AV 1
Front Display : Auto Dim
DVD EP Mode Time : 6Hours
Chapter Creator : Off

No Disc
System
Setup
Timer Rec.
VCR
MOVE
SELECT
RETURN
EXIT

4 Press the ▲▼ buttons to select **Video Input**, then press the **ENTER** or ▶button.


DVD EP Mode Time : 6Hours
Chapter Creator : Off

No Disc
System
Setup
Timer Rec.
VCR
Video Input
Front Display
✓AV 1
S-Video
MOVE
SELECT
RETURN
EXIT

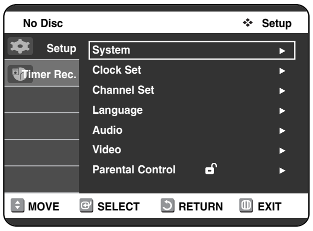
5 Press the ▲▼ buttons to select **AV 1** or **S-Video**, then press the **ENTER** or ▶ button.

Front Display

Adjust the brightness of the unit's front display.

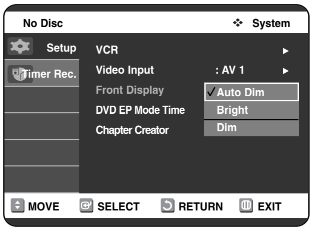
1 With the unit in Stop mode/No Disc mode, press the **MENU** button.

2 Press the ▲▼ buttons to select **Setup**, then press the **ENTER** or ▶ button.


No Disc
Setup
Setup
Timer Rec.
System
Clock Set
Channel Set
Language
Audio
Video
Parental Control
MOVE
SELECT
RETURN
EXIT

3 Press the ▲▼ buttons to select **System**, then press the **ENTER** or ▶ button.

4 Press the ▲▼ buttons to select **Front Display**, then press the **ENTER** or ▶ button.


No Disc
System
Setup
Timer Rec.
VCR
Video Input
: AV 1
Front Display
Auto Dim
Bright
Dim
DVD EP Mode Time
Chapter Creator
MOVE
SELECT
RETURN
EXIT

5 Press the ▲▼ buttons to select the desired item, then press the **ENTER** or ▶ button.

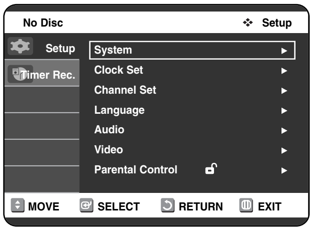
- **Auto Dim** – Front Display will dim automatically during power off.
- **Bright** – Front Display will be bright all the time.
- **Dim** – Front Display will be dim all the time.

DVD EP Mode Time

You can set the EP(Extended Play)mode's time setting to 6 or 8hours.

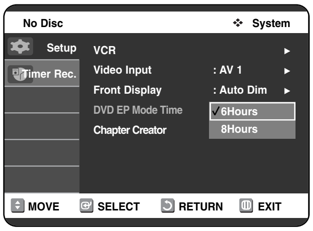
1 With the unit in Stop mode/No Disc mode, press the **MENU** button.

2 Press the ▲▼ buttons to select **Setup**, then press the **ENTER** or ▶ button.


No Disc
Setup
Setup
Timer Rec.
System
Clock Set
Channel Set
Language
Audio
Video
Parental Control
MOVE
SELECT
RETURN
EXIT

3 Press the ▲▼ buttons to select **System**, then press the **ENTER** or ▶ button.

4 Press the ▲▼ buttons to select **DVD EP Mode Time**, then press the **ENTER** or ▶ button.


No Disc
System
Setup
Timer Rec.
VCR
Video Input
: AV 1
Front Display
: Auto Dim
DVD EP Mode Time
6Hours
8Hours
Chapter Creator
MOVE
SELECT
RETURN
EXIT

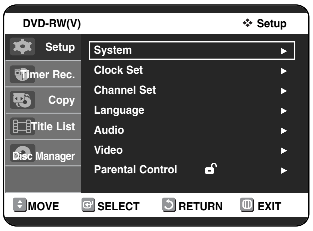
5 Press the ▲▼ buttons to select **6 Hours** or **8 Hours**, then press the **ENTER** or ▶ button.

Automatic Chapter Creator

This function only works with DVD-RW (Video mode) and DVD-R discs.
A DVD-Video consists of ‘Titles’ and ‘Chapters’.
When you record one program, it makes one Title.
If you use this function, the Title will be divided into Chapters.

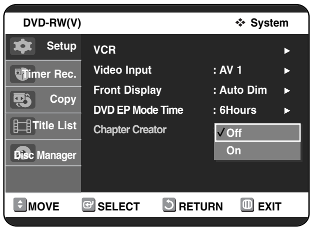
1 With the unit in Stop mode/No Disc mode, press the **MENU** button.

2 Press the ▲▼ buttons to select **Setup**, then press the **ENTER** or ▶ button.


DVD-RW(V)
Setup
Setup
Timer Rec.
Copy
Title List
Disc Manager
System
Clock Set
Channel Set
Language
Audio
Video
Parental Control
MOVE
SELECT
RETURN
EXIT

3 Press the ▲▼ buttons to select **System**, then press the **ENTER** or ▶ button.

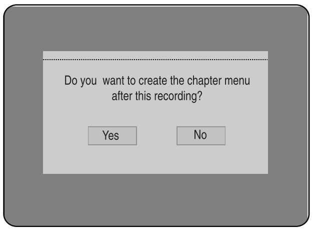
4 Press the ▲▼ buttons to select **Chapter Creator**, then press the **ENTER** or ▶ button.


DVD-RW(V)
System
Setup
Timer Rec.
Copy
Title List
Disc Manager
VCR
Video Input : AV 1
Front Display : Auto Dim
DVD EP Mode Time : 6Hours
Chapter Creator ✓Off On
MOVE
SELECT
RETURN
EXIT

5 Press the ▲▼ buttons to select **On**, then press the **ENTER** or ▶ button.
Press the **MENU** button to exit the menu.

6 Set the recording speed by pressing the **REC SPEED** button on the remote (see page 53 for more information on recording speeds).

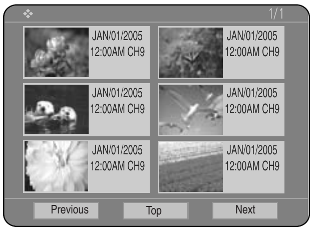
7 Press the **REC** button to start recording.
The message "Do you want to create the chapter menu after this recording?" is displayed.


Do you want to create the chapter menu after this recording?

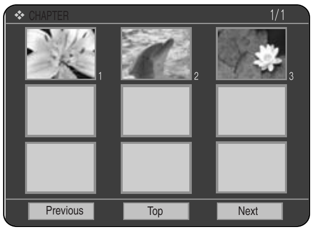
8 Press the ◀ ▶ buttons to select **Yes** and press the **ENTER** button and recording begins.
In XP and SP mode, you must record at least 5 minutes to create a chapter. In LP and EP mode, 15 minutes.

9 Press the **STOP** button to stop recording.

10 To display the created titles, finalize the disc (see page 79) and then press the **TITLE MENU** button. The title menu will be displayed.


1/1
JAN/01/2005 12:00AM CH9
JAN/01/2005 12:00AM CH9
JAN/01/2005 12:00AM CH9
JAN/01/2005 12:00AM CH9
JAN/01/2005 12:00AM CH9
JAN/01/2005 12:00AM CH9
Previous
Top
Next

11 To display the created chapters, select the desired Title and then press the **DISC MENU** button. The chapter menu for the selected Title will be displayed.


CHAPTER
1/1
1
2
3
Previous
Top
Next

Note

- On DVD-RW discs, additional chapters and titles can be added to a finalized disc by unfinalizing and recording again.On DVD-R discs, once finalized, no additional chapters or titles can be recorded.

CAUTION

- The Automatic Chapter Creator function does not work during Timer Recording or when you turn the power off.
- DVD-R discs cannot be unfinalized.

Playback

This section introduces basic functions of playback by disc type.

Dolby Digital

DTS

Digital Audio

Stereo

NTSC broadcast system in U.S.A, Canada, Korea, Japan,etc.

MP3

◆ *DVD Playback*

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◆ *VCR Playback*

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S-VHS Playback..........49
Variable Search System..........50

Before Playing

Read the following information before playing a disc.

Region code (DVD-Video only)

Both the DVD Recorder & VCR and the discs are coded by region. These regional codes must match in order for the disc to play. If the codes do not match, the disc will not play. The Region Number for this DVD Recorder & VCR is described on the rear panel of the DVD Recorder & VCR.

Disc types that can be played

Disc Types	Disc Logo	Recorded content	Disc Shape	Max. Playing Time
DVD-VIDEO	DVD VIDEO	AUDIO + VIDEO	Single sided(5")	240
			Double sided(5")	480
			Single sided(3.5")	80
			Double sided(3.5")	160
AUDIO-CD	COMPACT disc DIGITAL AUDIO	AUDIO	Single sided(5")	74
			Single sided(3.5")	20
JPEG CD-R/RW		JPEG Images	Single sided(5")	-
			Single sided(3.5")	-
MP3 CD-R/RW		MP3 Audio	Single sided(5")	-
			Single sided(3.5")	-
DVD-RAM	DVD RAM	AUDIO + VIDEO	Single-sided 5" (4.7GB)	1 (XP: Excellent Quality)
				2 (SP: Standard Quality)
				4 (LP: Long Playback)
				6 or 8 (EP:Extended)
			Double-sided 5" (9.4GB)	2 (XP: Excellent Quality)
				4 (SP: Standard Quality)
				8 (LP: Long Playback)
				12 or 16 (EP:Extended)
DVD-RW	DVD RW	AUDIO + VIDEO	5" (4.7GB)	1 (XP: Excellent Quality)
				2 (SP: Standard Quality)
				4 (LP: Long Playback)
				6 or 8 (EP:Extended)
DVD-R	DVD R	AUDIO + VIDEO	5" (4.7GB)	1 (XP: Excellent Quality)
				2 (SP: Standard Quality)
				4 (LP: Long Playback)
				6 or 8 (EP:Extended)

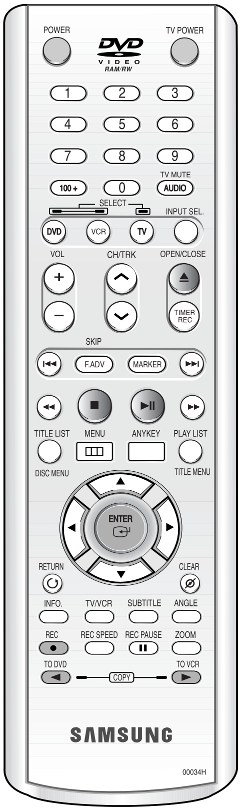
Discs that cannot be played

- DVD-Video with a region number other than "1" or "ALL"
- 3.9 GB DVD-R Disc for Authoring.
- DVD-RAM not recorded following the Video Recording Standard
- Unfinalized DVD-R,unfinalized DVD-RW(V mode)
- PAL discs
- DVD-ROM/DVD+RW/PD/MV-Disc/DiVX Video Disc, etc
- Video CD/CVD/SVCD/CD-ROM/CDV/CD-G/CD-I

Note

- This DVD Recorder & VCR can only operate with discs that are compatible with DVD-RAM Standard Version 2.0.
- Playback and/or recording may not work for some types of discs, or when specific operations, such as angle change and aspect ratio adjustment, are being performed. Information about the discs is written in detail on the box. Please refer to this if necessary.
- Do not allow the disc to become dirty or scratched, fingerprints, dirt, dust, scratches or deposits of cigarette smoke on the recording surface may make it impossible to use the disc for recording.
- DVD-RAM/-RW/-R discs may not be able to play on some DVD players, depending on the player, disc and the condition of the recording.
- Discs with PAL programs recorded on them cannot be recorded using this product.

Playing a Disc


POWER
TV POWER
DVD VIDEO RAM/RW
1
2
3
4
5
6
7
8
9
TV MUTE
100+
0
AUDIO
SELECT
INPUT SEL.
DVD
VCR
TV
VOL
CH/TRK
OPEN/CLOSE
TIMER REC
SKIP
F.ADV
MARKER
TITLE LIST
MENU
ANYKEY
PLAY LIST
DISC MENU
TITLE MENU
ENTER
RETURN
CLEAR
INFO.
TV/VCR
SUBTITLE
ANGLE
REC
REC SPEED
REC PAUSE
ZOOM
TO DVD
TO VCR
COPY
SAMSUNG
00034H

1 Press the **OPEN/CLOSE** button.

2 Place a disc gently into the tray with the disc's label facing up.

3 Press **OPEN/CLOSE** button to close the disc tray.
- Your DVD Recorder & VCR closes the disc tray and plays the disc automatically.
- The recorder does not play discs automatically after the initial power on.
- When the recorder is powered on and a disc is in the tray, the unit will be activated and wait in stop status.
- Press the **PLAY** button to start playback.
- If you insert an MP3 Disc, your DVD Recorder & VCR will display the file list on the screen and start playing.
- If you insert a JPEG Disc, folders and a file list are displayed.
- If you want the unit to play automatically when it is powered on with a disc in the unit, power on with the **PLAY** button.

4 Press the **STOP** button to stop playback.

Note

- When you stop disc play, the DVD Recorder & VCR remembers where you stopped. When you press **PLAY** button again, it will pick up where you left off. (unless the disc is removed or the DVD Recorder & VCR is unplugged, or if you press the **STOP** button twice.) This function is only applicable to DVD-VIDEO, DVD-RAM, DVD-RW, DVD-R or Audio CDs (CD-DA).

CAUTION

- Do not move your DVD Recorder & VCR while playing, as this may cause damage to the disc.
- Make sure to press the **OPEN/CLOSE** button to open or close the disc tray.
- Do not push the disc tray while it is being opened or closed, as this may cause a product malfunction.
- Do not place foreign materials on or in the disc tray.
- Some functions may perform differently or be disabled depending on the disc type. If this occurs, refer to the instructions written on the disc case.
- Be especially careful that children's fingers are not caught between the disc tray and the tray chassis when it closes.
- After turning power on, it will take a few seconds until the DVD Recorder & VCR operates.

Using the Disc Menu and Title Menu

Some discs contain a dedicated menu system that allows you to select special functions for title, chapters, audio track, subtitles, film previews, information on characters, etc.

For DVD-VIDEO disc

DVD-VIDEO

1 Press the **DISC MENU** button to enter the disc menu of the disc.

- Move to the setup menu related to playback operation.
- You can select audio language and subtitle etc. provided by the disc.

2 Press the **TITLE MENU** button to move to the title menu of the disc.

- Use this button if the disc contains more than one title. Some discs may not support the title menu functionality.

For DVD-RAM/DVD-RW/DVD-R disc

DVD-RAM DVD-RW DVD-R

1 Press the **TITLE LIST** button to display title list.

Note

- ■ Title List : Title List shows a list to help you select a title. Since the title list consists of the information on video that is actually recorded, if one title is deleted, that title cannot be played again.
- ■ Play List : This refers to a unit of playback, which is made by selecting a desired scene in the entire Title List. When one playlist is played, only the scene selected by the user will play and then stop. Since only the information necessary for playing a desired scene is included in a playlist, even if that playlist is deleted, the original recording will not be deleted.

Using the Search & Skip Functions

Searching through a Chapter or Track

DVD-VIDEO DVD-RAM DVD-RW DVD-R CD

During the playback, press the **SEARCH** ◀◀ or ▶▶ button on the remote control. Each time you press the **SEARCH** button, the playback speed will change as follows.

DVD-VIDEO/ DVD-RAM/DVD-RW DVD-R	FF1/FR1→FF2/FR2→FF3/FR3→ FF4/FR4→FF5/FR5→FF6/FR6
AUDIO CD(CD-DA)	→FF1/FR1→FF2/FR2→ FF3/FR3

- You can scan the program in reverse order.
  To return to normal speed playback, press the ▶II button.

Note

- ■ No sound is heard during Scan(Search) mode, except CDs (CD-DA).

Skipping Chapters or Tracks

During the playback, press the I◀◀ or ▶▶I button on the remote control.

- **If you press the I◀◀ button**
  If you press the I◀◀ button, it moves to the beginning of the chapter, track or marker(DVD-RAM, DVD-RW(VR mode)). Pressing the button once again within 3 seconds returns to the beginning of the previous chapter, track or marker(DVD-RAM, DVD-RW(VR mode)).
- **If you press the ▶▶I button**
  If you press the ▶▶I button, it moves to the next chapter, track or marker(DVD-RAM, DVD-RW(VR mode))

Skipping ahead 30 seconds

During the playback, press **F.ADV/SKIP** button to skip ahead exactly 30 seconds.

Slow Motion Play/ Step Motion Play

Slow Motion Play (DVD-VIDEO / DVD-RAM / DVD-RW / DVD-R)

DVD-VIDEO DVD-RAM DVD-RW DVD-R

During pause mode, press the **SEARCH** ◄◄ or ►► button on the remote control for more than 1 second.

- Each time you press the ►► button :
  I► X 1/8 → I► X 1/4 → I► X 1/2
- Each time you press the ◄◄ button :
  ◄I X 1/8 → ◄I X 1/4 → ◄I X 1/2

To return to normal speed playback, press the ►II button.

Step Motion Play (DVD-VIDEO/DVD-RAM / DVD-RW / DVD-R)

DVD-VIDEO DVD-RAM DVD-RW DVD-R

During pause mode, press the **F.ADV** button on the remote control.

- Each time the button is pressed, a new frame will appear.

To return to normal speed playback, press the ►II button.

Note

- ■ No sound is heard during STEP or SLOW mode.

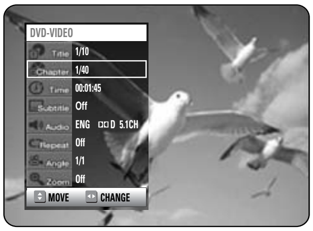
About ANYKEY

The ANYKEY functions allows you to easily search for a desired scene by accessing title, chapter, track and time. You can also change the subtitle and audio settings and set some features including Repeat, Angle and Zoom.

Moving to a scene directly using the ANYKEY

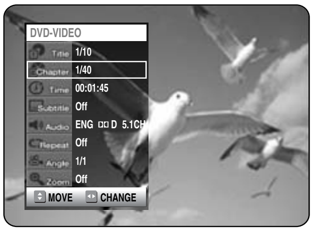
- If you want to move to a title, a chapter or a track to find a desired scene.

1 Press the **ANYKEY** button during playback.



DVD-VIDEO
Title 1/10
Chapter 1/40
Time 00:01:45
Subtitle Off
Audio ENG D 5.1CH
Repeat Off
Angle 1/1
Zoom Off

2 Press the ▲▼ buttons to select **Title**, **Chapter** or **Track**.

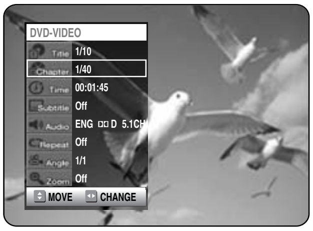


DVD-VIDEO
Title 1/10
Chapter 1/40
Time 00:01:45
Subtitle Off
Audio ENG D 5.1CH
Repeat Off
Angle 1/1
Zoom Off

3 Press the ◄ ► buttons or number (**0~9**) buttons to select the desired scene.
Then, press the **ENTER** button.

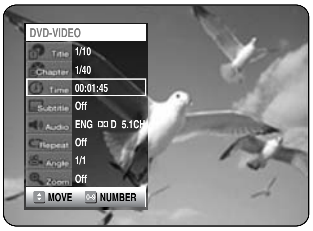
- If you want to move to a desired time to help you find a scene.

1 Press the **ANYKEY** button during playback.



DVD-VIDEO
Title 1/10
Chapter 1/40
Time 00:01:45
Subtitle Off
Audio ENG DD D 5.1CH
Repeat Off
Angle 1/1
Zoom Off
MOVE CHANGE

2 Press the ▲▼ buttons to select **Time**.



DVD-VIDEO
Title 1/10
Chapter 1/40
Time 00:01:45
Subtitle Off
Audio ENG DD D 5.1CH
Repeat Off
Angle 1/1
Zoom Off
MOVE NUMBER

3 Enter the time in the sequence of hours, minutes, and seconds using the number buttons, then press the **ENTER** button.

Note

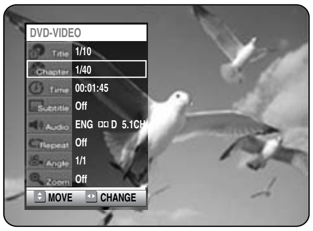
- This may not work for some discs. When an Audio CD(CD-DA) or an MP3 disc is inserted, according to a disc type, the information display may not be appear.
- The Time Search function does not operate in some discs.
- To make the screen disappear, press the **ANYKEY** button again.

Repeat Play

Playing Repeatedly(Repeat Playback)

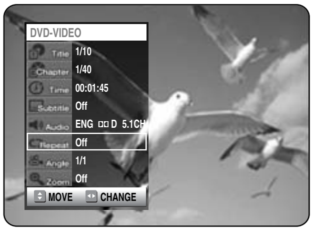
DVD-VIDEO DVD-RAM DVD-RW DVD-R

1 Press the **ANYKEY** button during playback.



DVD-VIDEO
Title 1/10
Chapter 1/40
Time 00:01:45
Subtitle Off
Audio ENG DD D 5.1CH
Repeat Off
Angle 1/1
Zoom Off
MOVE CHANGE

2 Press the ▲▼ buttons to select **Repeat**.



DVD-VIDEO
Title 1/10
Chapter 1/40
Time 00:01:45
Subtitle Off
Audio ENG DD D 5.1CH
Repeat Off
Angle 1/1
Zoom Off
MOVE CHANGE

3 Select repeat mode using ◄► button.
Press the **ENTER** button.
- To make the screen disappear, press the **ANYKEY** or **RETURN** button.

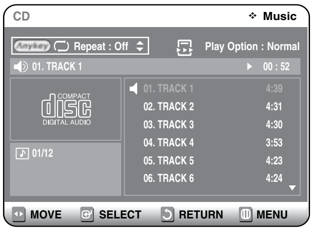
Note

- DVD-RAM, DVD-RW(VR mode), unfinalized DVD-R and unfinalized DVD-RW (Video mode) do not repeat a chapter.

Playing Repeatedly(Repeat Playback)

CD MP3

1 Press the **ANYKEY** button during playback. Repeat is highlighted.



CD

Repeat : Off

Play Option : Normal

01. TRACK 1 00 : 52

01/12

01. TRACK 1	4:39
02. TRACK 2	4:31
03. TRACK 3	4:30
04. TRACK 4	3:53
05. TRACK 5	4:23
06. TRACK 6	4:24

2 Press the ▲▼ buttons to select the **Track** or **Disc** you want to play repeatedly. Press the **ENTER** button.
For MP3 discs, you can select **Track**, **Folder** or **Disc**.

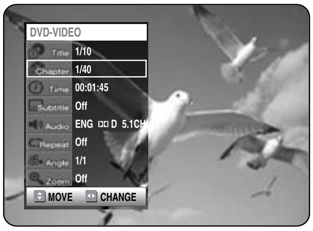
- To return to normal playback -

3 Press the **CLEAR** button to return to normal playback.

Playing a Certain section Repeatedly(A-B Repeat Playback)

DVD-VIDEO DVD-RAM DVD-RW DVD-R

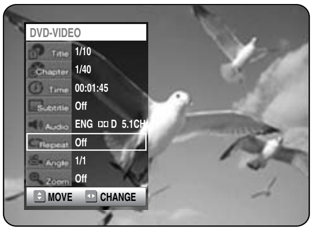
1 Press the **ANYKEY** button during playback.



DVD-VIDEO

Title 1/10
Chapter 1/40
Time 00:01:45
Subtitle Off
Audio ENG DD D 5.1CH
Repeat Off
Angle 1/1
Zoom Off

2 Press the ▲▼ buttons to select **Repeat**.

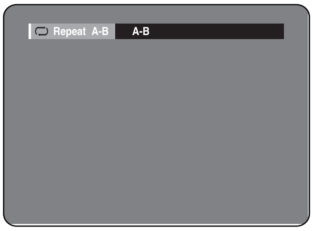


DVD-VIDEO

Title 1/10
Chapter 1/40
Time 00:01:45
Subtitle Off
Audio ENG DD D 5.1CH
Repeat Off
Angle 1/1
Zoom Off

3 Press the ◄► button to select **A-B**, then press the **ENTER** button.

4 Press the **ENTER** button at the point where you want the repeat play to start (A) and press it again at the point where you want the repeat play to stop (B). Repeat playback of the A-B section starts.



Repeat A-B A-B

Note

- If you set point (B) before five seconds has lapsed, the prohibition mark (⊘) will appear.
- You can also activate Normal Playback by pressing the **CLEAR** button.
- CDs do not support the Repeat A-B function.

- To return to normal playback -

5 Press the **CLEAR** button to return to normal playback.

Selecting the Subtitle & Audio Language

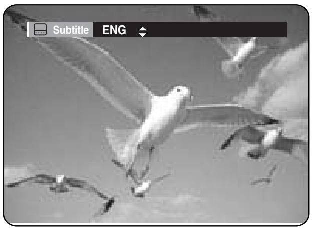
DVD-VIDEO DVD-RAM DVD-RW
(VR mode)

Selecting the SUBTITLE language

Subtitle languages may not work depending on the disc type. This is only available during playback.

Using the SUBTITLE button

1 Press the **SUBTITLE** button during playback.

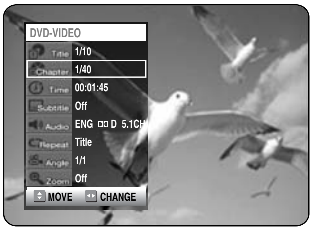


Subtitle ENG

2 Press the ▲▼ buttons to select the desired subtitle language.
- To make the screen disappear, then press the **CLEAR** or **RETURN** button.

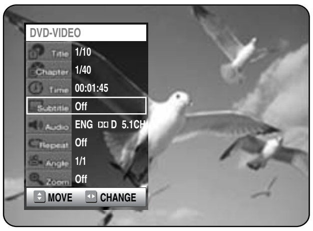
ANYKEY Using the ANYKEY button

1 Press the **ANYKEY** button during playback.



DVD-VIDEO
Title 1/10
Chapter 1/40
Time 00:01:45
Subtitle Off
Audio ENG DD D 5.1CH
Repeat Title
Angle 1/1
Zoom Off
MOVE CHANGE

2 Press the ▲▼ buttons to select **Subtitle**, then press the ◄ ► buttons to select the desired subtitle language.



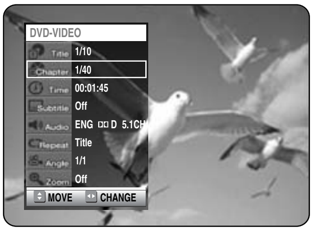
DVD-VIDEO
Title 1/10
Chapter 1/40
Time 00:01:45
Subtitle Off
Audio ENG DD D 5.1CH
Repeat Off
Angle 1/1
Zoom Off
MOVE CHANGE

Note
- The subtitle display may be different depending on the disc type.
- If the subtitles overlap, disable the caption function on your TV.
- Some discs allow you to select the language for the disc menu only.

Selecting the Audio language

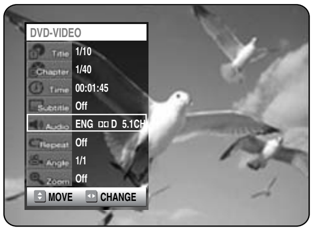
Audio languages may not work depending on the disc type. This is only available during playback.

1 Press the **ANYKEY** button during playback.



DVD-VIDEO
Title 1/10
Chapter 1/40
Time 00:01:45
Subtitle Off
Audio ENG DD D 5.1CH
Repeat Title
Angle 1/1
Zoom Off
MOVE CHANGE

2 Press the ▲▼ buttons to select **Audio**, then press the ◄ ► buttons to select the desired audio language.



DVD-VIDEO
Title 1/10
Chapter 1/40
Time 00:01:45
Subtitle Off
Audio ENG DD D 5.1CH
Repeat Off
Angle 1/1
Zoom Off
MOVE CHANGE

Note
- Audio languages may be different because they are disc-specific.
- Some discs allow you to select the audio language for the disc menu only.

Changing the Camera Angle

DVD-VIDEO

When a DVD Recorder & VCR contains multiple angles of a particular scene, you can select the Angle function.

Using the ANGLE button

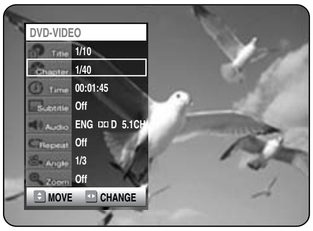
If the disc contains multiple angles, the **ANGLE** appears on the screen.

1 Press the **ANGLE** button, then the ANGLE icon will appear with the current angle number and the number of angles available.

2 Press the ▲▼ button to select the desired angle.

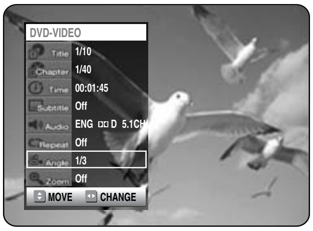
Using the ANYKEY button

1 Press the **ANYKEY** button during playback.



DVD-VIDEO
Title 1/10
Chapter 1/40
Time 00:01:45
Subtitle Off
Audio ENG DD D 5.1CH
Repeat Off
Angle 1/3
Zoom Off
MOVE CHANGE

2 Press the ▲▼ buttons to select **Angle**, then press the ◄ ► buttons or number (0~9) buttons to select the desired angle scene.



DVD-VIDEO
Title 1/10
Chapter 1/40
Time 00:01:45
Subtitle Off
Audio ENG DD D 5.1CH
Repeat Off
Angle 1/3
Zoom Off
MOVE CHANGE

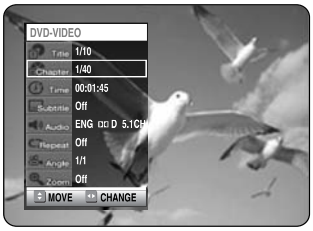
Note

- This function is disc-dependent, and may not work all DVDs.
- This function does not work when a DVD has not been recorded with a multi-camera angle system.

Zooming-In

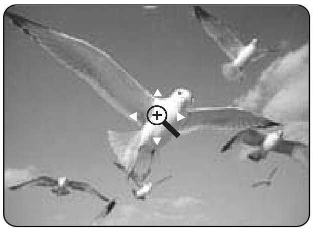
DVD-VIDEO DVD-RAM DVD-RW DVD-R

1 Press the **ANYKEY** button during playback.



DVD-VIDEO
Title 1/10
Chapter 1/40
Time 00:01:45
Subtitle Off
Audio ENG DD D 5.1CH
Repeat Off
Angle 1/1
Zoom Off
MOVE CHANGE

2 Press the ▲▼ buttons to select **Zoom**, then press the **ENTER** button. (🔍) will be displayed.



3 Press ▲▼, ◄ ► buttons to move to the area you want to enlarge.

4 Press the **ENTER** button.
The screen will be enlarged to twice the normal size. The screen size will be enlarged to four times the normal size.

DVD-VIDEO/ DVD-RAM/DVD-RW/ DVD-R	normal size → 2X → 4X → 2X → normal size

Note

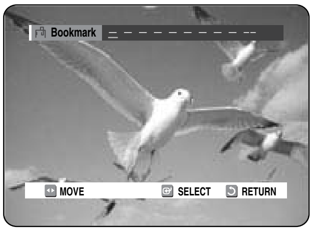
- When recording is done in the EP mode, the Zoom function will not be supported. (except when the recording has been done in V mode)

Using the Bookmarks

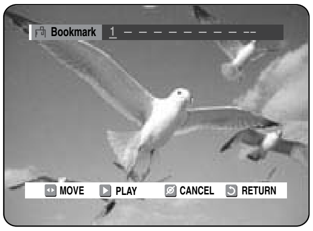
DVD-VIDEO DVD-RW DVD-R
(V-mode)

Set marks at scenes you want to see again so that you can start playback from the marked position.

1 Press the **MARKER** button during playback.

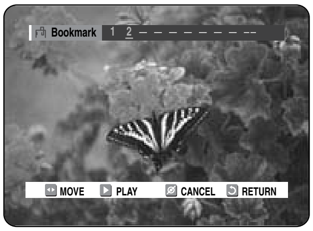

Bookmark
MOVE
SELECT
RETURN

2 Press the **ENTER** button when the desired scene appears.
- The number 1 is displayed and the scene is memorized.


Bookmark
1
MOVE
PLAY
CANCEL
RETURN

3 Press the ◄ ► button to move to the next position.

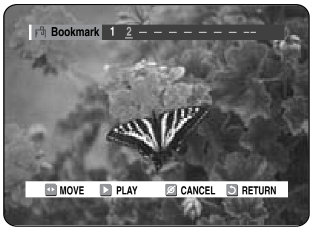
4 Press the **ENTER** button again when the desired scene appears.
- The number 2 is displayed and the scene is memorized. Repeat above to bookmark other positions. You can bookmark up to 10 scenes.


Bookmark
1 2
MOVE
PLAY
CANCEL
RETURN

Playing back a Bookmark

1 Press the **MARKER** button.

2 Press the ◄ ► buttons to select a bookmarked scene.

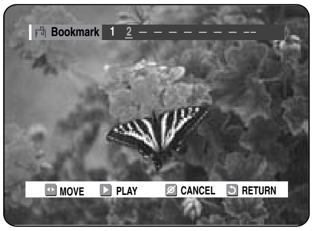

Bookmark
1 2
MOVE
PLAY
CANCEL
RETURN

3 Press the **ENTER** or **►II** button to start playing from the selected scene.

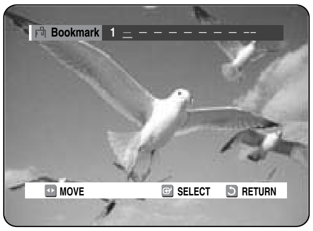
Clearing a Bookmark

1 Press the **MARKER** button.

2 Press the ◄ ► buttons to select a bookmarked scene.


Bookmark
1 2
MOVE
PLAY
CANCEL
RETURN

3 Press the **CLEAR** button to delete the selected bookmark.

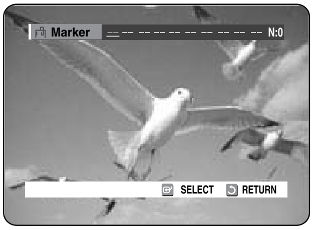

Bookmark
1
MOVE
SELECT
RETURN

Playback

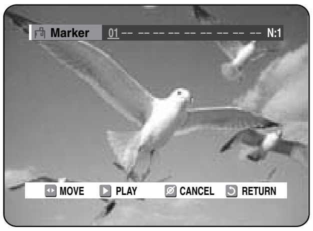
Using the Markers

DVD-RAM DVD-RW
(VR mode)

1 Press the **MARKER** button during playback.


Marker
N:0
SELECT
RETURN

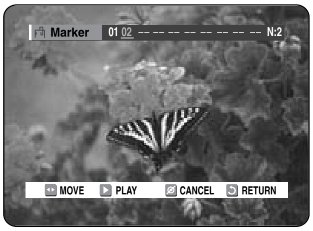
2 Press the **ENTER** button when the desired scene appears.


Marker
01
N:1
MOVE
PLAY
CANCEL
RETURN

- The number 01 is displayed and the scene is memorized.

3 Press the ◄ ► button to move to the next position.

4 Press the **ENTER** button again when the desired scene appears.

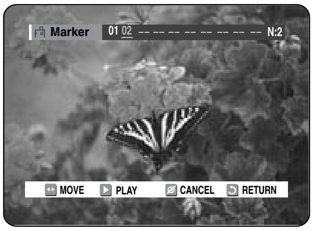

Marker
01 02
N:2
MOVE
PLAY
CANCEL
RETURN

- The number 02 is displayed and the scene is memorized.
- DVD-RAM or DVD-RW (VR Mode) discs have the Marker function instead of the Bookmark function. The Marker function allows you to mark up to 99 scenes. Since the scenes may be displayed as many different pages, numbering is necessary. If a disc in use is encoded with Disc Protect, Markers cannot be set or deleted. Only playback is available.

Playing back a Marker

1 Press the **MARKER** button during playback.

2 Press the ◄ ► buttons to select a marked scene.

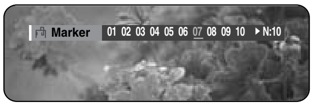

Marker
01 02
N:2
MOVE
PLAY
CANCEL
RETURN

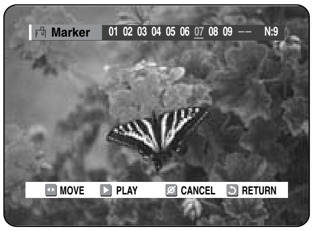
3 Press the **ENTER** or **►I I** button to start playing from the selected scene.
- If you press the **NEXT SKIP** (**►►I**)button or the **PREVIOUS SKIP**(**I◄◄**)button in marker mode, and the next or current marked point plays for shorter than three seconds, playback starts from the previous marked point.

Clearing a Marker

1 Press the **MARKER** button during playback.

2 Press the ◄ ► buttons to select a marked scene. Press the **CLEAR** button to delete the selected mark.


Marker
01 02 03 04 05 06 07 08 09 10
N:10


Marker
01 02 03 04 05 06 07 08 09 --
N:9
MOVE
PLAY
CANCEL
RETURN

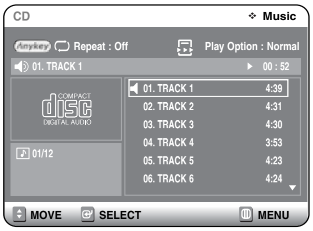
- When a marker is cleared while DVD-RAM/ DVD-RW(VR mode) is playing, marker numbers will change. For example, if the 7th marker is cleared after ten markers are registered, the marker numbers after the eighth will automatically move ahead by one and the 8th marker becomes the 7th.

Playing back an Audio CD (CD-DA)

Each disc has a variety of menu functions available.

Playing an Audio CD(CD-DA)

1 Insert an Audio CD (CD-DA) into the disc tray.
- The Audio CD menu appears and the tracks (songs) are played automatically.



CD ✧ Music

Anykey Repeat : Off Play Option : Normal

01. TRACK 1 ▶ 00 : 52

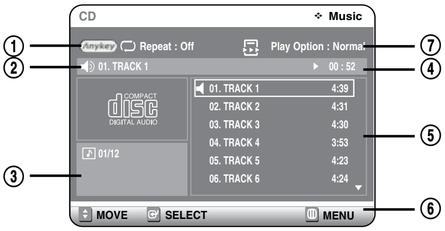
01/12

01. TRACK 1	4:39
02. TRACK 2	4:31
03. TRACK 3	4:30
04. TRACK 4	3:53
05. TRACK 5	4:23
06. TRACK 6	4:24

COMPACT disc DIGITAL AUDIO
MOVE
SELECT
MENU

2 Press the ▲▼ buttons to select the track (song) to start playback from, and then press the **ENTER** button.
- You can also select the track (song) by pressing the number buttons on the remote.

Audio CD(CD-DA) Screen Elements



CD ✧ Music

Anykey Repeat : Off Play Option : Normal

01. TRACK 1 ▶ 00 : 52

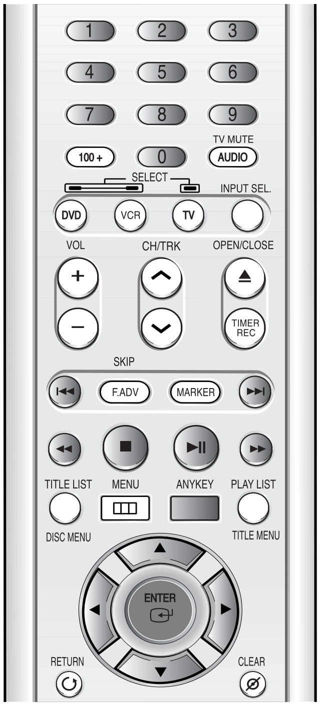
01/12

01. TRACK 1	4:39
02. TRACK 2	4:31
03. TRACK 3	4:30
04. TRACK 4	3:53
05. TRACK 5	4:23
06. TRACK 6	4:24

①
②
③
⑦
④
⑤
⑥
COMPACT disc DIGITAL AUDIO
MOVE
SELECT
MENU

1. **Repeat mode**: Repeat off/Repeat Track/Repeat Disc.
2. **Current track (song)**: Displays the number of the track currently being played.
3. Displays the current play index and total track number.
4. This shows the operating state of a disc and a playback time corresponding to a portion that is currently played.
5. Displays the track list (song list) and the playing time of each track.
6. Button display.
7. **Play Option**: Normal, Random, Intro or Playlist

Buttons on the Remote Control used for CD playback



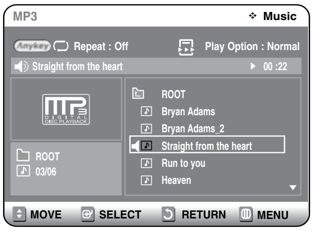
1
2
3
4
5
6
7
8
9
TV MUTE
100+
0
AUDIO
SELECT
INPUT SEL.
DVD
VCR
TV
VOL
CH/TRK
OPEN/CLOSE
TIMER REC
SKIP
F.ADV
MARKER
TITLE LIST
MENU
ANYKEY
PLAY LIST
DISC MENU
TITLE MENU
ENTER
RETURN
CLEAR

1. **▲▼, 0~9:** Selects a track (song).
2. **▶ :** Plays the selected track (song).
3. **ENTER button:** Plays the selected track (song).
4. **▶▶I button:** Plays the next track.
5. **I◀◀button:** Returns to the beginning of the current track when pressed during playback. If pressed again, your DVD Recorder & VCR moves to and plays the previous track.
   If you press this button within three seconds after playback starts, the previous track will be played.
   If you press this button after three seconds, the current track will be replayed from the beginning.
6. Press the (◀◀ /▶▶) button**:** Fast Play (FF1/FR1, FF2/FR2, FF3/FR3)
7. **■ :** Stops a track(song).
8. **▶II :** Plays a track(song) or pauses playback.
9. **ANYKEY :** To select the top menu on screen display (Repeat or Play Option).

Playing back an MP3 CD

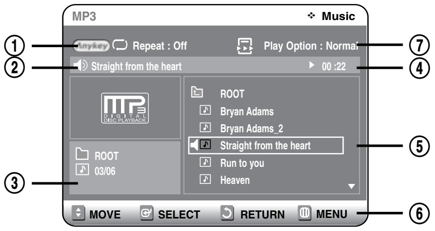
Playing an MP3 Disc

1 Insert an MP3 CD into the disc tray.
- The MP3 menu is displayed and the tracks (songs) are played automatically.


MP3
Music
Anykey
Repeat : Off
Play Option : Normal
Straight from the heart
00 :22
ROOT
Bryan Adams
Bryan Adams_2
Straight from the heart
Run to you
Heaven
ROOT
03/06
MOVE
SELECT
RETURN
MENU

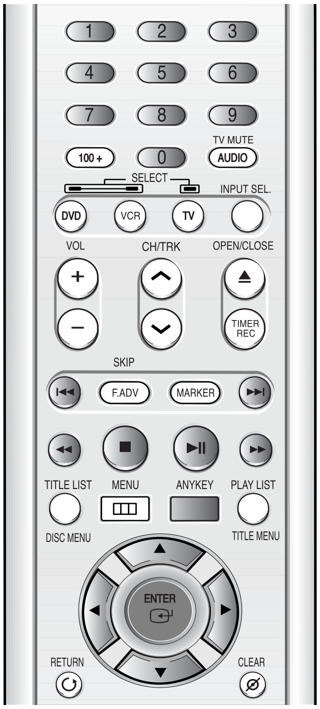
2 Press the ▲▼ buttons to select the folder you want to hear, and then press the **ENTER** button.
- Press the ▲▼ buttons to select the track (song) you want to hear, and then press the **ENTER** button.
- You can also select the desired track (song) by pressing the number buttons on the remote.

MP3 Screen Elements


①
②
③
④
⑤
⑥
⑦
MP3
Music
Anykey
Repeat : Off
Play Option : Normal
Straight from the heart
00 :22
ROOT
Bryan Adams
Bryan Adams_2
Straight from the heart
Run to you
Heaven
ROOT
03/06
MOVE
SELECT
RETURN
MENU

1. **Repeat mode:** Repeat off, Repeat Track, Repeat Folder or Repeat Disc
2. **Current track (song):** Displays the name of the track being played.
3. Displays the current folder and play index.
4. This shows the operating state of a disc and a playback time corresponding to a portion that is currently played.
5. Displays the information for the folder and its tracks.
6. Button display.
7. **Play Option :** Normal, Random, Intro or Playlist

Buttons on the Remote Control used for MP3 CD playback

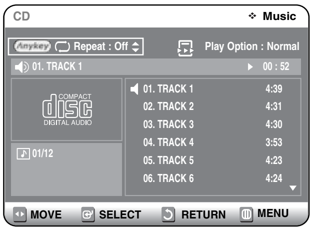

1
2
3
4
5
6
7
8
9
TV MUTE
100 +
0
AUDIO
SELECT
INPUT SEL.
DVD
VCR
TV
VOL
CH/TRK
OPEN/CLOSE
TIMER REC
SKIP
F.ADV
MARKER
TITLE LIST
MENU
ANYKEY
PLAY LIST
DISC MENU
TITLE MENU
ENTER
RETURN
CLEAR

1. **▲▼, 0~9:** Selects a track (song).
2. **▶ :** Plays the selected track (song).
3. **ENTER** button**:** Plays the selected track (song) or displays the files in the selected folder.
4. **RETURN** button**:** Moves to the folder to which the current song belongs.
5. **▶▶I** button**:** Plays the next track.
6. **I◀◀** button**:** Returns to the beginning of the current track when pressed during playback. If pressed again, your DVD Recorder & VCR moves to and plays the previous track.
   If you press this button within three seconds after playback starts, the previous track will be played.
   If you press this button after three seconds, the current track will be replayed from the beginning.
7. **■ :** Stops a track(song).
8. **▶II :** Plays a track(song) or pauses playback.
9. **ANYKEY :** To select the top menu on screen display (Repeat or Play Option).

Play Option Mode

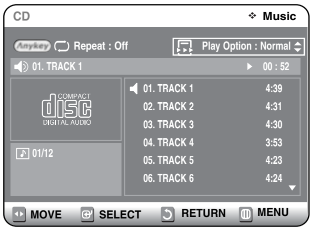
The Play Option can be used with an Audio CD or MP3 in the Play or Stop mode.

1 Press the **ANYKEY** button during playback. Repeat mode will be highlighted.


CD
Music
Anykey
Repeat : Off
Play Option : Normal
01. TRACK 1
00 : 52
COMPACT disc DIGITAL AUDIO
01/12
01. TRACK 1 4:39
02. TRACK 2 4:31
03. TRACK 3 4:30
04. TRACK 4 3:53
05. TRACK 5 4:23
06. TRACK 6 4:24
MOVE
SELECT
RETURN
MENU

- During Stop, Play option will be highlighted.

2 Press the ◄ ► buttons to select **Play Option**.


CD
Music
Anykey
Repeat : Off
Play Option : Normal
01. TRACK 1
00 : 52
COMPACT disc DIGITAL AUDIO
01/12
01. TRACK 1 4:39
02. TRACK 2 4:31
03. TRACK 3 4:30
04. TRACK 4 3:53
05. TRACK 5 4:23
06. TRACK 6 4:24
MOVE
SELECT
RETURN
MENU

3 Press the ▲▼ buttons to select a desired Play Option, then press the **ENTER** button.

- **Normal:** Tracks on a disc are played in the order in which they were recorded on the disc.
- **Random:** The Random option plays a disc's tracks in random order. After a random list is generated and played completely, another random list is generated and played.
  Random Play is continued until the play option is changed.
- **Intro:** The first 10 seconds of each track will be played.If you want to listen to the music that you have selected, press the **ENTER** button or ►II button. The play option will be changed to Normal Play. When Intro Play is completed, Normal Play is performed.
- **Playlist:** The Playlist playback option allows you to select the order in which you want tracks to play.

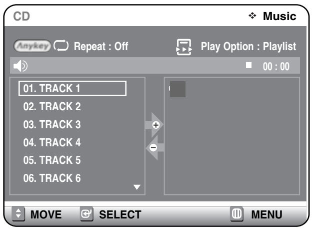
To Program Tracks

You can register a maximum 30 tracks in the playlist.

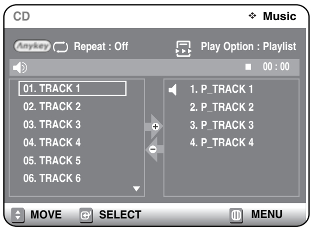
1 Press the **ANYKEY** button during playback. Repeat mode will be highlighted.
- During Stop, Play option will be highlighted.

2 Press the ◄ ► buttons to select **Play Option**.

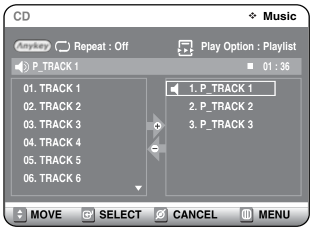
3 Press the ▲▼ buttons to select **Playlist**, then press the **ENTER** button.
Playlist screen is displayed.


CD
Music
Anykey
Repeat : Off
Play Option : Playlist
00 : 00
01. TRACK 1
02. TRACK 2
03. TRACK 3
04. TRACK 4
05. TRACK 5
06. TRACK 6
MOVE
SELECT
MENU

4 Press the ▲▼ buttons to select tracks in the order in which you want them to play, then press the **ENTER** button.


CD
Music
Anykey
Repeat : Off
Play Option : Playlist
00 : 00
01. TRACK 1
02. TRACK 2
03. TRACK 3
04. TRACK 4
05. TRACK 5
06. TRACK 6
1. P_TRACK 1
2. P_TRACK 2
3. P_TRACK 3
4. P_TRACK 4
MOVE
SELECT
MENU

5 If you playlisted a wrong track, press the ► button, then press the ▲▼ buttons to select wrong track. Press the **CLEAR** button. The wrong track will be removed.


CD
Music
Anykey
Repeat : Off
Play Option : Playlist
P_TRACK 1
01 : 36
01. TRACK 1
02. TRACK 2
03. TRACK 3
04. TRACK 4
05. TRACK 5
06. TRACK 6
1. P_TRACK 1
2. P_TRACK 2
3. P_TRACK 3
MOVE
SELECT
CANCEL
MENU

6 Press the **PLAY** button to playback the playlist.

Playing a picture CD

JPEG

There are two types of Picture CDs. One is a CD with only JPEG files. The other one is a CD with JPEG files and MP3 files.(mixed CD)

1. When a mixed CD is played, a menu will be shown in order to let you choose which contents, either JPEG or MP3, you want to play.

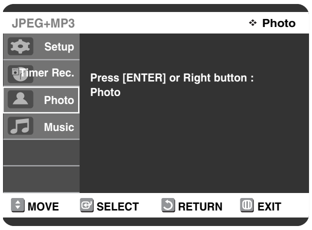
1-1. If you want to play MP3 files on a mixed CD, choose Music on the menu, then it will take you to the MP3 play back screen.

1-2. If you want to play JPEG files on a mixed CD, choose Photo on the menu, then it will take you
to photo playback screen. See number 3 on this page.

2. When a Picture CD(CD with only JPEG files) is played, the recorder will show the Album screen,with thumbnail images. See number 3 on this page.

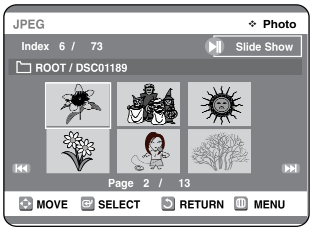
1 Insert a Picture CD(JPEG only) or Mixed CD(JPEG + MP3)into the disc tray.

2 When playing a Mixed CD, press the ▲▼ buttons to select **Photo**, then press the **ENTER** or ▶ button. (when playing a Picture CD, see number 3 on this page.)


JPEG+MP3
Photo
Setup
Timer Rec.
Photo
Music
MOVE
SELECT
RETURN
EXIT

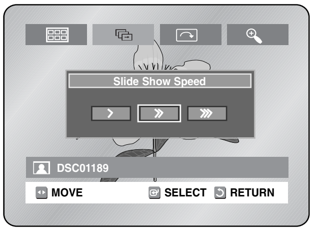
Press [ENTER] or Right button : Photo

3 Press the ▲▼ ◀ ▶ buttons to select a picture.

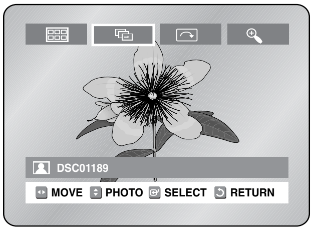

JPEG
Photo
Index 6 / 73
Slide Show
ROOT / DSC01189
Page 2 / 13
MOVE
SELECT
RETURN
MENU

- To see the next 6 pictures, press the ▶▶I button.
- To see the previous 6 pictures, press the I◀◀ button.

4-1 If you press the ▶II button, the Slide show screen will appear.
Press the ◀ ▶ buttons to set the slide show speed, then press the **ENTER** button.


Slide Show Speed
DSC01189
MOVE
SELECT
RETURN

4-2 Press the ◀ ▶ buttons to select a picture file in Album screen and then press the **ENTER** button.


DSC01189
MOVE
PHOTO
SELECT
RETURN

▦ : Returns to the Album screen.

⧉ : The unit enters slide show mode.
Before the slide show can begin, the picture interval (Slide show speed) must be set.

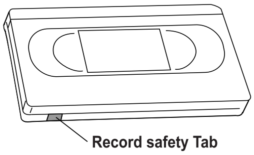
⟳ : Each time the **ENTER** button is pressed, the picture rotates 90 degrees clockwise.

🔍 : Each time the **ENTER** button is pressed, the picture is enlarged up to 4X(four times the normal size).
Normal → 2X → 4X → 2X → Normal

- Press the **ANYKEY** button to display menu bar.
- Press the **RETURN** button to clear the menu bar.

Playing the VCR

To play a standard VHS tape, just insert it into the VCR deck and press the **PLAY** button. You can turn on the Auto Play to enable the VCR deck to play automatically when you insert a videotape that is missing the Record Safety Tab.



1 Insert a standard VHS tape into the VCR deck.
- When a tape is inserted, power will turn on automatically.

2 Press the ►II(**PLAY/PAUSE**) button on the remote control or on the front panel of the unit. The videotape will begin to play automatically if the Record Safety Tab is removed and Auto Play is turned on.

3 Press the ■(**STOP**) button on the remote control or on the front panel of the unit.

Tracking

The Tracking adjustment removes the white lines that sometimes appear during playback because of slight differences in recording decks. The **CH/TRK** (∧/∨) button will automatically align the recorded tracks with the playback heads to solve this problem. You may also set tracking manually.

1 Adjust Tracking Manually
During playback, press the **CH/TRK** (∧/∨) buttons to remove white lines from the picture.

Special VCR Playback Features

While a videotape is playing, you can enjoy a variety of special playback features, including Still, Frame Advance, Skip, Slow motion, and more.

Pause

In Play mode, press ►II(**PLAY/PAUSE**)button to still a single frame.

Frame Advance

In the pause mode, press **F.ADV/SKIP** button to advance to the next frame.

Fps/Review

In Play mode, press Forward (►►)button or Rewind (◄◄)button to Cue/review at two speeds:
- Picture Search - Press and release repeatedly to advance the tape forward or backward at 2,3,5,7 times normal speed.
- Jet Search - Press and hold to advance the tape forward or backward at 7 times normal speed.

Skip

In Play mode, press **F.ADV/SKIP** button to cue ahead exactly 30 seconds. Press **F.ADV/SKIP** button repeatedly up to 4 times to cue ahead 2 minutes.

Slow motion

In pause mode, press ►► button for slow motion. Press the ►► button repeatedly to vary slow motion speed from 1/5 to 1/30 of normal playback. Press the **PLAY** button twice to resume normal viewing.

S-VHS Playback

The DVD Recorder & VCR allows you to playback high quality S-VHS tapes.

1 Insert an S-VHS tape into the VCR deck.

2 Press ►II(**PLAY/PAUSE**)button on the remote control or on the front panel to begin playback of the S-VHS tape.

Variable Search System

Each time you record a cassette on this DVD Recorder & VCR, an “index” is automatically marked on the tape when recording starts.The Search function allows you to fast-forward or rewind to a specific index and start playback from that point. Depending on the direction selected, the indexes are numbered as follows

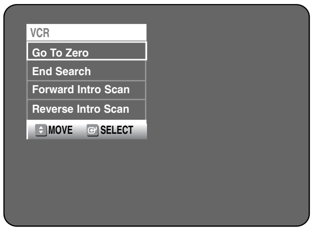
- This DVD Recorder & VCR uses a standard indexing system (VISS). As a result, it will recognize any indexes marked by other VCRs using the same system and vice versa.

Go To [0:00:00] Stop

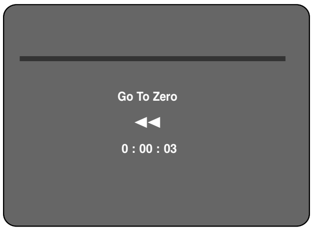
Use this feature when you want to search for the 0:00:00 counter position on a cassette.

1 Press the **CLEAR** button at the point on the tape where you want to set the counter to 0:00:00.

2 While a cassette is stopped, press the **ANYKEY** button.


VCR
Go To Zero
End Search
Forward Intro Scan
Reverse Intro Scan
MOVE
SELECT

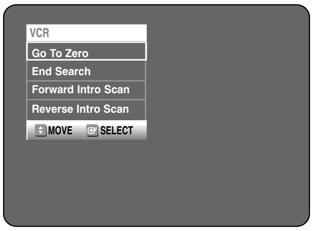
3 Press the ▲▼ buttons to select **Go To Zero**, then press the **ENTER** button.
The VCR will rewind or fast forward, searching for the 0:00:00 counter position, and then automatically stop at that position.


Go To Zero
◄◄
0 : 00 : 03

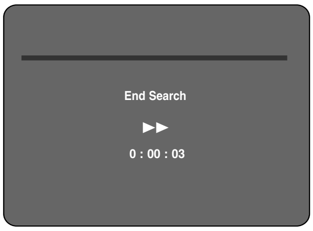
End Search

Use this feature when you want to search for a blank position to record a program on a cassette.

1 While a cassette is stopped, press the **ANYKEY** button.


VCR
Go To Zero
End Search
Forward Intro Scan
Reverse Intro Scan
MOVE
SELECT

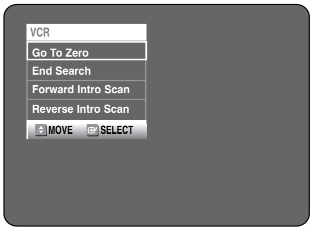
2 Press the ▲▼ buttons to select **End Search**, then press the **ENTER** button.
The VCR will fast forward, searching for a blank position, and then automatically stop at that position. If the VCR reaches the end of the tape during end search, the tape will be ejected.


End Search
►►
0 : 00 : 03

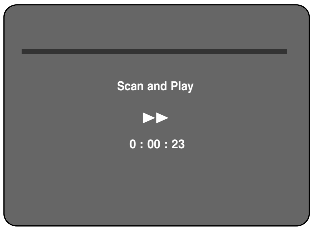
Forward/Backward Intro Scan

Use scan and play when you don’t know exactly where a program is located on a cassette tape.

1 While a cassette is stopped, press the **ANYKEY** button.


VCR
Go To Zero
End Search
Forward Intro Scan
Reverse Intro Scan
MOVE
SELECT

2 Press the ▲▼ buttons to select **Forward Intro Scan** or **Reverse Intro Scan**, then press the **ENTER** button. When an Index mark is found, the DVD Recorder & VCR will playback the tape for 5 seconds, after which it will continue searching for the next Index mark.


Scan and Play
►►
0 : 00 : 23

Recording

This section shows various DVD recording methods.

◆ *DVD Recording*

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Recording Formats 52
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◆ *VCR Recording*

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Before Recording

This unit can record on various types of discs. Before recording, read the following instructions and select the disc type according to your preference.

Recordable discs

This recorder can record on the following discs.

DVD-RAM	DVD-RW	DVD-R
DVD RAM	DVD RW	DVD R

•DVD-RWs and DVD-RAMs are rewritable.
•DVD-Rs are non-rewritable.

Compatibility between Samsung and Other Company's Recorder.

Disc Types	Recording format	Recording Device	Finalizing	Additional Recording in Samsung Recorder
DVD-RAM	VR Mode	Samsung	X	Recordable
		Other Company	X	Recordable
DVD-RW	VR Mode	Samsung	finalized	Not recordable
			not finalized	Recordable
		Other Company	finalized	Not recordable
			not finalized	Recordable
	V Mode	Samsung	finalized	Not recordable
			not finalized	Recordable
		Other Company	finalized	Not recordable
			not finalized	Not recordable
DVD-R	V Mode	Samsung	finalized	Not recordable
			not finalized	Recordable
		Other Company	finalized	Not recordable
			not finalized	Not recordable

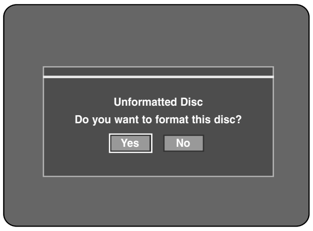
Note

- ■ Finalize
  - This closes the DVD-RW/-R so no additional recording can be done.
- ■ Unfinalize
  - This allows additional recording on a DVD-RW disc originally recorded on the DVD-VR320.
  - A DVD-RW disc that has been recorded by DAO(Disc At Once) in a PC cannot be unfinalized.
  - A DVD-RW disc that has been recorded in Video Mode of a different maker's recorder cannot be unfinalized.
  - A DVD-R disc cannot be unfinalized.

Recording Formats

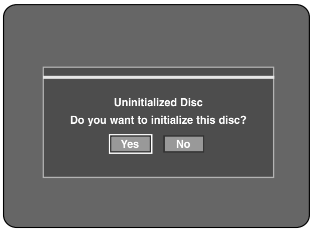
When you insert an unused disc, the following message appears. Since available functions differ depending on the disc type, select a disc that best fits your preferences.

DVD-RAM: Use after formatting the disc.



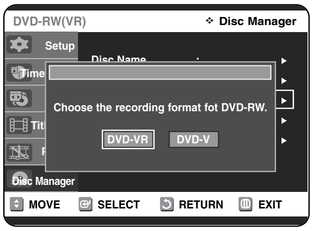
Unformatted Disc
Do you want to format this disc?

DVD-RW: When an unused DVD-RW disc is first inserted, the message “Uninitialized Disc/Do you want to initialize this disc?” will be displayed. If you select Yes, the disc will be formatted in VR mode.



Uninitialized Disc
Do you want to initialize this disc?

If you want to change the mode, refer to Formatting a Disc on page 78.



DVD-RW(VR)

Choose the recording format fot DVD-RW.

DVD-R: Formatting DVD is unnecessary and only Video Mode Recording is supported.

DVD-RW(Video mode)/-R

- Chapters will be created automatically when you finalize recording on DVD-R/DVD-RW discs in Video mode.
- Simple editing (erasing titles/changing title name).

DVD-RAM/-RW(VR mode)

- This mode involves multiple editing functions (such as deletion of the whole title, partial deletion of a title, etc.).
- Various editing options using a created Playlist.

Recording Mode

Select one of four recording modes by pressing the **REC SPEED** button repeatedly while the unit is in Stop mode for the desired recording time and picture quality. In general, picture quality improves as the recording time decreases.

In AUTO mode, the most suitable record mode is adjusted automatically, according to remaining time on the disc and length of the timer recording.

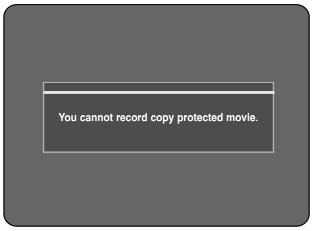
This function is selected only one mode in XP,SP,LP and EP modes. And you can use this mode for timer recording.

Mode	Characteristic	Recording Times Data Rates
XP (high quality mode)	Select when the video quality is important.	Approx. 1 hours about 8 Mbps
SP (standard quality mode)	Select to record in standard quality.	Approx. 2 hours about 4 Mbps
LP (long recording mode)	Select when a long recording time is required.	Approx. 4 hours about 2 Mbps
EP (extended mode)	Select when a long recording time is required.	Approx. 6 hours/ about 1.2 Mbps Approx. 8 hours/ about 0.8 Mbps
AUTO	for timer recording only see page 56.	Approx 60 to 480 Min approx 0.8 to 8Mbps

Unrecordable video

Pictures with copy protection cannot be recorded on this DVD Recorder & VCR.

When the DVD Recorder & VCR receives a copy guard signal while recording, recording stops and the following message appears on the screen.



You cannot record copy protected movie.

Concerning Copy Control Signals

TV broadcasts that contain copy control signals may have one of the following three signal types, Copy-Free, Copy-Once and Copy-Never. If you want to record a copy-once type program, use DVD-RW with CPRM in VR Mode and DVD-RAM.

	Copy-Free	Copy-Once	Copy-Never
DVD-RW(Ver.1.1)	O	-	-
DVD-RW(Ver.1.1) with CPRM			
VR mode	O	O*	-
Video mode	O		-
DVD-R	O	-	-
DVD-RAM(Ver.2.0)	O	O*	-

Once "Copy Once" has been recorded, additional recording cannot be performed.
This * marked parts are compatible with CPRM.

- Content Protection for Recordable Media (CPRM)

CPRM is a mechanism that ties a recording to the media on which it is recorded. It is supported by some DVD recorders, but not by many DVD players. Each blank recordable DVD has a unique 64-bit media ID etched in the BCA. When protected content is recorded onto the disc, it can be encrypted with a 56-bit C2 (Cryptomeria) cipher derived from the media ID.
During playback, the ID is read from the BCA and used to generate a key to decrypt the contents of the disc.
If the contents of the disc are copied to other media, the ID will be absent or wrong and the data will not be decryptable.

Recording the current channel you are watching

DVD-RAM DVD-RW DVD-R

1. Check the antenna cable is connected.
2. Check the remaining time on the disc.

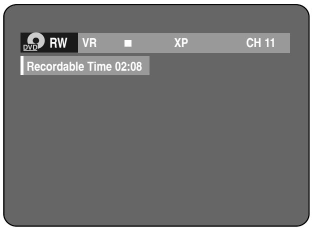
DVD-RAM/DVD-RW discs should be formatted in advance before beginning recording. Most new discs are sold unformatted. Make sure to format your unformatted discs before recording.

1 Press the **OPEN/CLOSE** button and place a recordable disc on the disc tray.

2 Press the **OPEN/CLOSE** button to close the disc tray.
Wait until "LOAD" disappears from the front panel display.

3 Press the **CH/TRK** (∧/∨) buttons or number buttons to select the channel you want to record.

4 Press the **REC SPEED** button repeatedly, to select the recording speed (quality).
- XP(High, approx. 1 hour) → SP(Standard, approx. 2 hours) → LP(Low, approx. 4 hours) → EP(Extended Play, approx. 6 hours/8hours)



5 Press the **REC** button.
- "●" is displayed on the screen and recording begins.

6 Press the **STOP** button to stop or finish a recording in progress.
- The message "Updating the information of disc. Please wait for a moment" is displayed.

Pausing / Resuming

- Press the **REC PAUSE** button to pause a recording in progress.
- Press the **REC PAUSE** button again during pause to resume recording.
- You can switch channels by pressing the **CH/TRK** (∧/∨) buttons while recording pauses.

Note

- ■ You can not change the recording mode and the channel while recording.
- ■ Recording will stop automatically if there is no free space left for recording.
- ■ Up to 99 titles can be recorded onto a disc.
- ■ If the power interrupted due to power failure or other reasons, the title being recorded will not be saved onto the disc.
- ■ Recording will stop automatically if a copy protected image is selected.
- ■ Do not use DVD-R authoring discs with this unit.

Recording From External Devices

Follow these directions to record onto a disc or a tape from External Devices.

1 Connect the AV out jack of your External Devices to the AV IN jack on the front or rear of your DVD Recorder & VCR using Audio/Video Cable.

2 Power on your DVD Recorder & VCR and switch to AV In mode by pressing the **INPUT SEL.** button on the remote control .
The front panel display changes in the following sequence depending on the Video input setting in the menu.

AV1: → Channel Number → AV 1 → AV 2 → DV

S-Video: → Channel Number → SUPER → AV 2 → DV

3 Press the **REC SPEED** button repeatedly to select the recording speed(quality).

→ SP → LP → EP → XP

4 When your DVD Recorder & VCR is in the stop mode, set the operation mode of your External Devices to play mode.

5 Press the **REC** button on your DVD Recorder & VCR to start recording when the desired video is displayed from the external device.

6 Press the **STOP** button on your DVD Recorder & VCR when the recording is finished.

Note

- Also refer to the user manual for your External Devices when recording through AV In jacks on the DVD/VCR using Audio/Video cables.
- For more information on changing the Video Input from AV1 to S-Video, see page 32(Video Input).

Recording through a DV Input jack

You may control the Camcorder using the IEEE1394 (DV) interface.
Follow these directions to record onto a disc or tape from a camcorder that has a DV output jack.

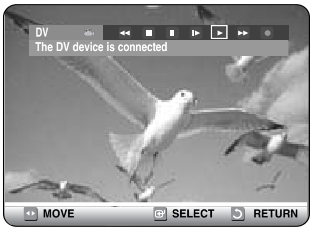
1 Connect the DV output jack of your camcorder to the DV input jack on the front of your DVD Recorder & VCR using a DV cable.

2 Power on your DVD Recorder & VCR and switch to DV mode by pressing the INPUT SEL. on the remote control.

3 Press the **REC SPEED** button repeatedly to select the recording speed(quality).

→ SP → LP → EP → XP

4 Press the **INPUT SEL.** button to select DV.
If the input is set to DV, a playback/record menu that enables camcorder control appears on the top of the screen.



The DV device is connected

5 Select the Play icon on the upper part of the screen to playback the camcorder and find the starting position to copy.
You can press the **PLAY** button on the remote control to playback the camcorder.

6 To start recording, Press the ◀▶ button to select rec(●) icon in the top side of the screen, then press the **ENTER** button.
You can press the **REC** button of the remote control to start recording. To display playback related icons on the screen, press any direction button on the remote control.

7 Press the **STOP** button on your DVD Recorder & VCR when the recording is finished.

Note

- Some camcorders may not work with your DVD Recorder & VCR even if they have a DV output jack.
- Also refer to the user manual for your camcorder when recording through a DV jack.

Making a One Touch Recording (OTR)

DVD-RAM DVD-RW DVD-R

One-Touch Recording (OTR) allows you to add recording time in 30-minute increments up to 4 hours by pressing the **REC** button.

1 Press the **CH/TRK** (∧/∨) buttons or number buttons to select the channel to record.
If you want to record through a connected external component, press the **INPUT SEL.** button to select an appropriate external input(AV1, AV2 or DV).
- CATV channel: 1 to 125
- TV channel: 2 to 69

2 Press the **REC** button to start recording.

3 While in Record mode, press the **REC** button again to activate One-Touch Recording (OTR).
- Record length 0:30 appears on the On-Screen Display and the DVD Recorder & VCR will record for exactly 30 minutes.

4 Continue pressing REC to add recording time in 30 minute increments up to 4hours.
(see page 52)
- The DVD Recorder & VCR stops recording automatically when the time has elapsed.

To stop recording

Press the **STOP** (■) button.
The message “Press Stop button once more to cancel Timer Record” is displayed.
Press the **STOP** (■) button again.
The message”Updating the Information of disc. Please wait for a moment” is displayed.

Note

■ The timer counter decreases by the minute from 4:00 to 0:00, then the DVD Recorder & VCR stops recording.

Making a Timer Recording

DVD-RAM DVD-RW DVD-R

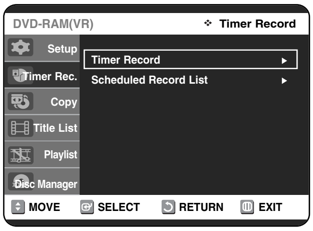
The clock (Initial Setup – Clock Set) must be set before proceeding with a timer recording. (See page 24)

1 Press the **OPEN/CLOSE** button, and place a recordable disc on the disc tray.

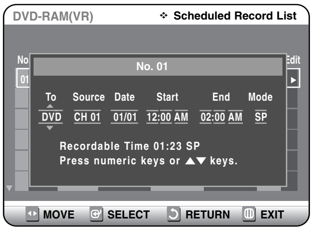
2 Press the **OPEN/CLOSE** button to close the disc tray.
Wait until “LOAD” disappears from the front panel display.

3 With the unit in Stop mode, press the **MENU** button.

4 Press the ▲▼ buttons to select **Timer Rec.**, then press the **ENTER** or ▶ button.



5 Press the ▲▼ buttons to select **Timer Record**, then press the **ENTER** or ▶ button.
You can also set a timer recording via the **TIMER REC** button.
The Timer Recording screen are displayed.



No. 01

To	Source	Date	Start	End	Mode
DVD	CH 01	01/01	12:00 AM	02:00 AM	SP

Recordable Time 01:23 SP
Press numeric keys or ▲▼ keys.

6 Fill in the items using the ▲▼◄ ► buttons.
◄ ► : Moves to the previous/next item,
▲▼ 0~9 : Sets a value.

- **To** : Select the media to record DVD or VCR.
- **Source** : The video input source (AV 1, AV 2), or the broadcasting channel you want to make a timer recording of.
- **Date:** Date that the timer recording starts

▲
01/31
01/30
:
01/02
Present Date 01/01
MON-FRI
Sun's
Mon's
:
Sat's
▼

- **Start/End Time** : Start and end time of the timer recording.

• Recording mode (DVD)

AUTO : Select when you want to set video quality automatically. In AUTO mode, the most suitable record mode is adjusted automatically, according to remaining time on the disc and length of the timer recording.
This function is selected only one mode in XP,SP,LP and EP modes. And you can use this mode for timer recording.

XP (high quality) : Select when audio and video qualities are important. (Approx. 1 hour)

SP (standard quality) : Select to record in standard quality. (Approx. 2 hours)

LP (low quality) : Select when a long recording time is required.(Approx. 4 hours)

EP (extended mode) : Select when a longer recording time is required. (Approx.6 hours at 1.2 Mbps or Approx.8 hours at 0.8 Mbps)

Note

■ When you are recording at EP mode on a DVD-RW(V)/R disc, it may not record the full 6 or 8 hours because the unit uses the VBR(Variable Bit Rate) ENCODING system. For example, if you record a program with a lot of action, it uses a higher bit rate which in turn consumes more disc memory.

• Recording mode (VCR)

AUTO : Select when you want to set video quality automatically. It depends on remaining time of VCR tape.

SP : Standard Play, for best picture quality.

SLP : Super Long Play, for maximum recording time (3 times SP).

---

7 Press the **ENTER** button.
- ◷ will appear on the front panel. It means that a timer recording is registered.

If the timer settings overlap

The programs are recorded in order of priority.
If timer recording is set for the first program and then again for the second program and both programs overlap, the following message will appear on the screen: “This setting is identical with 1.2” The message shows that the first program has priority. After recording of the first program is complete, the second program starts being recorded.

To exit without saving the current setting

Press the **MENU** or **TIMER REC** button.

To return to the previous menu

Press the **RETURN** button if you don’t want to set a timer recording.

---

8 Turn the power off to finish the timer recording.
- ◷ will blink if disc or tape is not inserted.

Note

■ The timer recording time may differ from the set time depending on disc status and overall timer recording status (for example, recording times overlapping, or when the previous recording ends within 3 minutes before the start time of the next recording.)

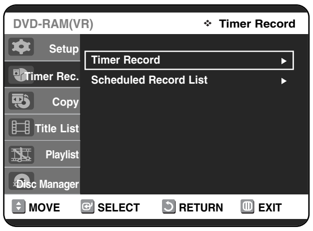
Editing the Scheduled Record List

DVD-RAM DVD-RW DVD-R

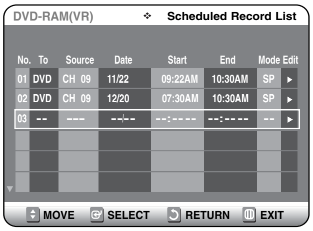
Follow these directions to edit the timer record list.

1 Press the **MENU** button.

2 Press the ▲▼ button to select **Timer Rec.**, then press the **ENTER** or ▶ button.

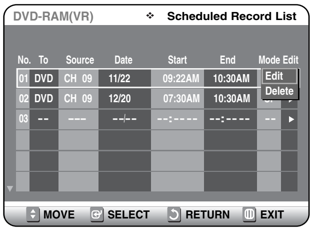

DVD-RAM(VR)
❖ Timer Record
Setup
Timer Rec.
Copy
Title List
Playlist
Disc Manager
Timer Record ▶
Scheduled Record List ▶
MOVE
SELECT
RETURN
EXIT

3 Press the ▲▼ button to select **Scheduled Record List**, then press the **ENTER** or ▶ button.


DVD-RAM(VR)
❖ Scheduled Record List
MOVE
SELECT
RETURN
EXIT

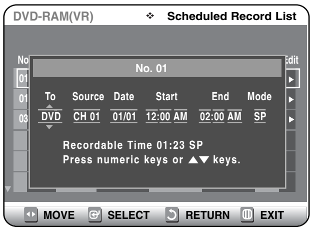
No.	To	Source	Date	Start	End	Mode	Edit
01	DVD	CH 09	11/22	09:22AM	10:30AM	SP	▶
02	DVD	CH 09	12/20	07:30AM	10:30AM	SP	▶
03	--	---	--/--	--:----	--:----	--	▶

4 Press the ▲▼ button to select the number of the scheduled record list you want to edit, then press the **ENTER** or ▶ button.
- The Edit and Delete items are displayed.


DVD-RAM(VR)
❖ Scheduled Record List
Edit
Delete
MOVE
SELECT
RETURN
EXIT

No.	To	Source	Date	Start	End	Mode	Edit
01	DVD	CH 09	11/22	09:22AM	10:30AM		
02	DVD	CH 09	12/20	07:30AM	10:30AM		
03	--	---	--/--	--:----	--:----	--	▶

5 Press the ▲▼ button to select **Edit**, then press the **ENTER** button.
- The Timer Recording screen is displayed. Edit the items you want to modify. See the Timer Recording section for more information on Timer Recording Input items.(See page 56)


DVD-RAM(VR)
❖ Scheduled Record List
No. 01
MOVE
SELECT
RETURN
EXIT

To	Source	Date	Start	End	Mode
DVD	CH 01	01/01	12:00 AM	02:00 AM	SP

Recordable Time 01:23 SP
Press numeric keys or ▲▼ keys.

6 Press the **ENTER** button to confirm the edited setting.

7 Press the **MENU** button after finishing the operation. The menu screen will disappear.

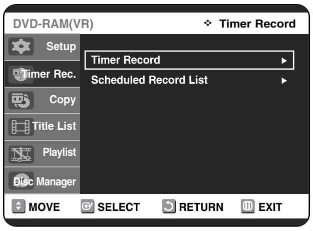
Deleting the Scheduled Record List

DVD-RAM DVD-RW DVD-R

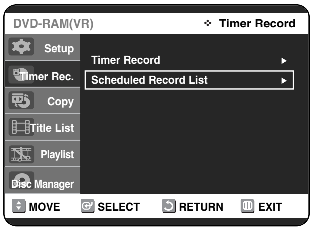
Follow these directions to delete a title from the timer record list.

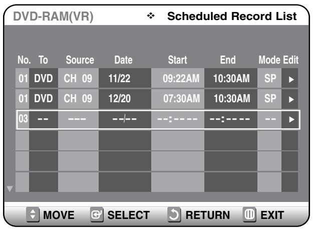
1 Press the **MENU** button.

2 Press the ▲▼ button to select **Timer Rec.**, then press the **ENTER** or ► button.


DVD-RAM(VR)
Timer Record
Setup
Timer Rec.
Copy
Title List
Playlist
Disc Manager
Timer Record ►
Scheduled Record List ►
MOVE
SELECT
RETURN
EXIT

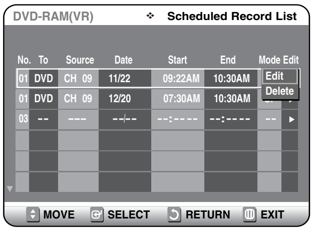
3 Press the ▲▼ button to select **Scheduled Record List**, then press the **ENTER** or ► button.


DVD-RAM(VR)
Timer Record
Setup
Timer Rec.
Copy
Title List
Playlist
Disc Manager
Timer Record ►
Scheduled Record List ►
MOVE
SELECT
RETURN
EXIT


DVD-RAM(VR)
Scheduled Record List
MOVE
SELECT
RETURN
EXIT

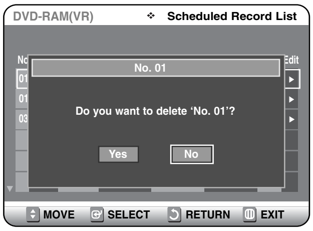
No.	To	Source	Date	Start	End	Mode	Edit
01	DVD	CH 09	11/22	09:22AM	10:30AM	SP	►
01	DVD	CH 09	12/20	07:30AM	10:30AM	SP	►
03	--	---	--/--	--:----	--:----	--	►

4 Press the ▲▼ button to select the number of the scheduled record list you want to delete, and then press the **ENTER** button.
- The Edit and Delete items are displayed.


DVD-RAM(VR)
Scheduled Record List
Edit
Delete
MOVE
SELECT
RETURN
EXIT

No.	To	Source	Date	Start	End	Mode	Edit
01	DVD	CH 09	11/22	09:22AM	10:30AM		
01	DVD	CH 09	12/20	07:30AM	10:30AM		
03	--	---	--/--	--:----	--:----	--	►

5 Press the ▲▼ button to select **Delete**, then press the **ENTER** or ► button.
- You will be prompted with the delete confirm message such as 'Do you want to delete No.01?'.


DVD-RAM(VR)
Scheduled Record List
Yes
No
MOVE
SELECT
RETURN
EXIT

No. 01

Do you want to delete 'No. 01'?

6 Press the ◄ ► buttons to select **Yes**, then press the **ENTER** button.
- The selected title will be deleted from the list.

7 Press the **MENU** button after finishing the operation. The menu screen will disappear.

Note

■ You can not delete programs that are currently recording.

Basic VCR Recording

Before starting
1. Check TV channel and Antenna connections.
2. Check the remaining time on the tape.

You can record a TV show in progress by inserting a blank tape and pressing the ●(**REC**) button. You can even add time in 30-minute increments up to 4 hours by pressing the ●(**REC**)button repeatedly.

Note

- Be sure your videotape has a Record Safety Tab. If the tab is missing, you can cover the opening with a small piece of tape.

CAUTION

- Warning: Do not cover this opening unless you are sure you want to record over the tape.

1 Insert a blank VHS tape into the VCR deck.
- Make sure the tape is long enough to record the entire program.

2 Press the **0–9** buttons or the **CH/TRK** (∧/∨) buttons to select the desired channel.
Press the **INPUT SEL.** button to select AV 1, AV 2 or DV if recording from an external device connected to the front or rear AV inputs, respectively.

3 Press the **REC SPEED** button on the remote control to set the Record Speed to one of the following options:
- SP – Standard Play, for best picture quality.
- SLP – Super Long Play, for maximum recording time (3 times SP).

Note

- The selected Record Speed will appear on the front panel display and on-screen display.

Maximum Recording Time - SP vs. SLP

Tape Length	SP (Standard Play)	SLP (Super Long Play)
T-120	2 hrs	6 hrs
T-160	2hrs 40 mins	8 hrs
T-180	3 hrs	9 hrs

Note

- When you watch or record on the VCR during DVD Recording, some function buttons may not operate.
The message “This function is not available.” will be displayed.

4 Press the ●(**REC**) button on the remote control or front panel.
For options while recording is in progress, see “Special Recording Features”.(see page 60)

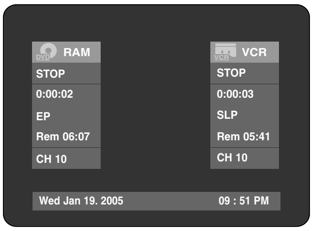
5 Press the **STOP** button to stop or finish a recording in progress.

Pausing / Resuming

- Press the **REC PAUSE** button to pause a recording in progress.
- Press the **REC PAUSE** button again during pause to resume recording.
- You can switch channels by pressing the **CH/TRK** (∧/∨) buttons while recording pauses.

Check Remaining Time

1 Press **INFO.** button on the remote control.
Following information will be displayed.
(Current deck status, recording speed, remaining time, input channel, current time.)



RAM	VCR
STOP	STOP
0:00:02	0:00:03
EP	SLP
Rem 06:07	Rem 05:41
CH 10	CH 10

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Special Recording Features

While a recording is in progress, you can watch a different channel, watch a different media, or add recording time in 30-minute increments.

1 Watch a Different Channel

When you watching through the Antenna input during recording, press the TV/VCR button on the remote control. Change the channel you want to watch.

- When you watching through AV input during recording, change the input of your TV from AV to Antenna.
  Change the channel you want to watch.

2 Watch a different media during recording

You can watch a DVD during VCR recording or watch a Video tape during DVD recording.

- During VCR recording, insert a DVD in the DVD deck. The output will automatically change to the DVD and start playback.
- During DVD recording, insert a Video tape in the VCR deck. The output will automatically change to the VCR and start playback. (Only if tape is missing the safety tab)

3 Add Recording Time

Refer to the One-Touch Recording (OTR).
(See page 55)

4 Recording DVD and VCR at the same time

You can record DVD and VCR at the same time, but both modes must be set up to record separately.

- Press the **DVD/VCR** button to set the unit to DVD or VCR mode.
- Choose AV input mode (CH, AV1, AV2 or DV). for DVD or VCR.
- Choose REC mode for DVD or VCR.
- Press **REC** button for DVD or VCR.

Note

- When DVD Recorder & VCR is connected to your TV using S-Video or component video cable, the playback screen on the video tape will not display during DVD recording.
- You cannot record different channels at the same time.
- The DVD and VCR cannot start recording at the exact same time. You must set one mode to start recording, then the other.

Copy to DVD or VCR

DVD-RAM DVD-RW DVD-R

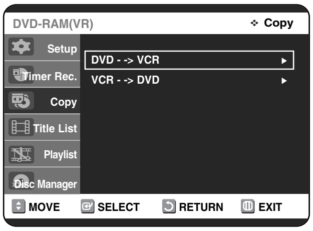
You can copy from the DVD to VCR or VCR to DVD.
Check the remaining time on the tape and Disc.

To copy from DVD to VCR

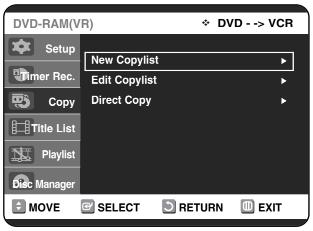
DVD-RAM DVD-RW
(VR mode)

1 With the unit in Stop mode, press the **MENU** button.

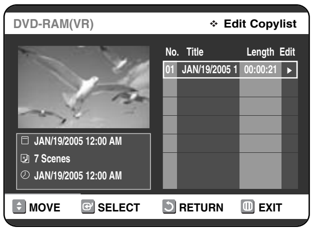
2 Press the ▲▼ buttons to select **Copy**, then press the **ENTER** or ▶ button.


DVD-RAM(VR)
Copy
Setup
Timer Rec.
Copy
Title List
Playlist
Disc Manager
DVD - -> VCR
VCR - -> DVD
MOVE
SELECT
RETURN
EXIT

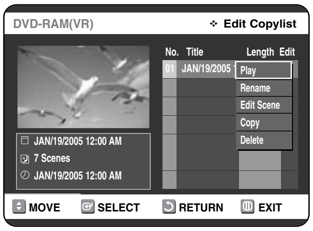
3 Press the ▲▼ buttons to select **DVD --> VCR**, then press the **ENTER** or ▶ button.


DVD-RAM(VR)
DVD - -> VCR
Setup
Timer Rec.
Copy
Title List
Playlist
Disc Manager
New Copylist
Edit Copylist
Direct Copy
MOVE
SELECT
RETURN
EXIT

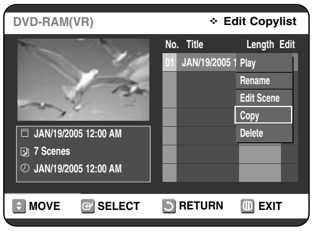
4 Press the ▲▼ buttons to select **Edit Copylist**, then press the **ENTER** or ▶ button.


DVD-RAM(VR)
Edit Copylist
No. Title Length Edit
01 JAN/19/2005 1 00:00:21
JAN/19/2005 12:00 AM
7 Scenes
JAN/19/2005 12:00 AM
MOVE
SELECT
RETURN
EXIT

5 Press the ▲▼ buttons to select desired copylist, then press the **ENTER** or ▶ button.


DVD-RAM(VR)
Edit Copylist
No. Title Length Edit
01 JAN/19/2005
Play
Rename
Edit Scene
Copy
Delete
JAN/19/2005 12:00 AM
7 Scenes
JAN/19/2005 12:00 AM
MOVE
SELECT
RETURN
EXIT

6 Press the ▲▼ buttons to select **Copy**, then press the **ENTER** or ▶ button.


DVD-RAM(VR)
Edit Copylist
No. Title Length Edit
01 JAN/19/2005 1
Play
Rename
Edit Scene
Copy
Delete
JAN/19/2005 12:00 AM
7 Scenes
JAN/19/2005 12:00 AM
MOVE
SELECT
RETURN
EXIT

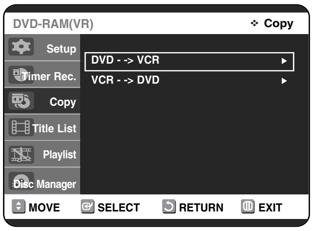
Direct copy DVD to VCR

- Insert a DVD disc you want to copy.
- Insert a VHS tape.
- Press the VCR copy button on front panel or remote control(TO VCR).
- To stop recording, press the **STOP** button.

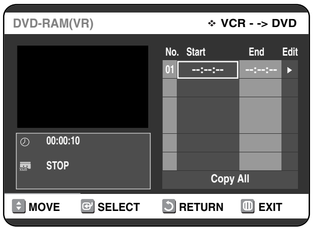
To copy from VCR to DVD

1 With the unit in Stop mode, press the **MENU** button in stop mode.

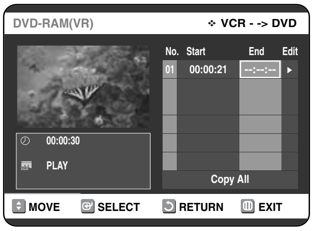
2 Press the ▲▼ buttons to select **Copy**, then press the **ENTER** or ▶ button.


DVD-RAM(VR)
Copy
Setup
Timer Rec.
Copy
Title List
Playlist
Disc Manager
DVD - -> VCR
VCR - -> DVD
MOVE
SELECT
RETURN
EXIT

3 Press the ▲▼ buttons to select **VCR-->DVD**, then press the **ENTER** or ▶ button.

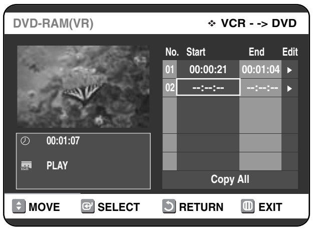

DVD-RAM(VR)
VCR - -> DVD
No. Start End Edit
01 --:--:-- --:--:--
00:00:10
STOP
Copy All
MOVE
SELECT
RETURN
EXIT

4 You can use the ▶II, I◀◀ or ▶▶I , ◀◀ or ▶▶ buttons to search for the Start position.
Press the **ENTER** button at the start point.

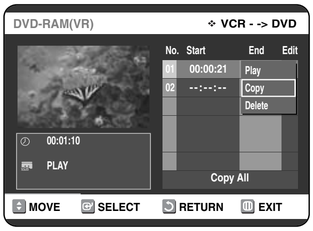

DVD-RAM(VR)
VCR - -> DVD
No. Start End Edit
01 00:00:21 --:--:--
00:00:30
PLAY
Copy All
MOVE
SELECT
RETURN
EXIT

5 You can use the ▶II, I◀◀ or ▶▶I , ◀◀ or ▶▶ buttons to search for the end position.
Press the **ENTER** button at the end point.

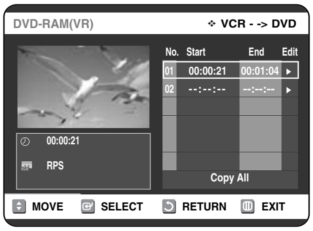
- A copylist will be generated.
  Repeat the above steps to create the copylist.
- In VCR mode, the copylist cannot be saved.


DVD-RAM(VR)
VCR - -> DVD
No. Start End Edit
01 00:00:21 00:01:04
02 --:--:-- --:--:--
00:01:07
PLAY
Copy All
MOVE
SELECT
RETURN
EXIT

6 Press the ▲▼ buttons to select desired copylist, then press the **ENTER** or ▶ button.


DVD-RAM(VR)
VCR - -> DVD
No. Start End Edit
01 00:00:21
02 --:--:--
Play
Copy
Delete
00:01:10
PLAY
Copy All
MOVE
SELECT
RETURN
EXIT

7 Press the ▲▼ buttons to select **Copy**, then press the **ENTER** or ▶ button.


DVD-RAM(VR)
VCR - -> DVD
No. Start End Edit
01 00:00:21 00:01:04
02 --:--:-- --:--:--
00:00:21
RPS
Copy All
MOVE
SELECT
RETURN
EXIT

- The VCR will fast forward, searching for a start position and then automatically start a copy.
- It may not be match up with Start and END point exactly.
- If you want to copy all content, select **Copy All**.

Direct copy VCR to DVD

- Insert the VHS tape you want to copy.
- Insert Recordable DVD disc.
- Press DVD copy button on front panel or remote control(TO DVD).
- To stop recording press the **STOP** button.

Editing

This section introduces basic functions of DVD editing and explains both edit functions for the recording on a disc and edit functions for the entire disc.

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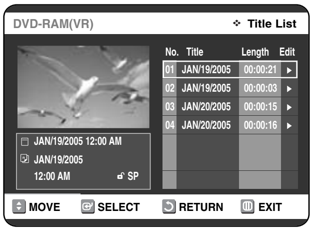
Playing the Title List

DVD-RAM DVD-RW DVD-R

Follow these instructions to play back a scene from the Title List.

Using the TITLE LIST button

1 Press the **TITLE LIST** button.
The Title List screen is displayed.


DVD-RAM(VR)
✣ Title List
MOVE
SELECT
RETURN
EXIT

No.	Title	Length	Edit
01	JAN/19/2005	00:00:21	▶
02	JAN/19/2005	00:00:03	▶
03	JAN/20/2005	00:00:15	▶
04	JAN/20/2005	00:00:16	▶

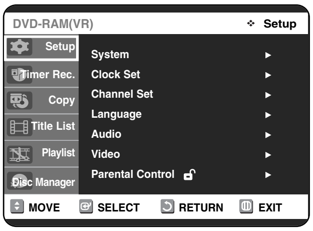
JAN/19/2005 12:00 AM
JAN/19/2005
12:00 AM SP

2 Press the ▲▼ buttons to select a title you want to play from Title List, and then press the **PLAY** button.
The selected title will be played back.

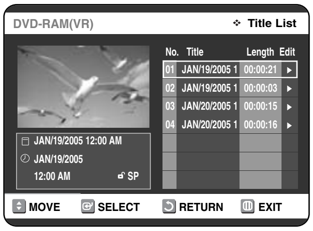
3 To stop title play, press the **STOP** button.
To return the title list screen, press the **TITLE LIST** button.

Using the MENU button

1 Press the **MENU** button.


DVD-RAM(VR)
✣ Setup
Setup
Timer Rec.
Copy
Title List
Playlist
Disc Manager
System ▶
Clock Set ▶
Channel Set ▶
Language ▶
Audio ▶
Video ▶
Parental Control ▶
MOVE
SELECT
RETURN
EXIT

2 Press the ▲▼ buttons to select **Title List**, then press the **ENTER** or ► button twice.
The Title List screen is displayed.



DVD-RAM(VR) ❖ Title List

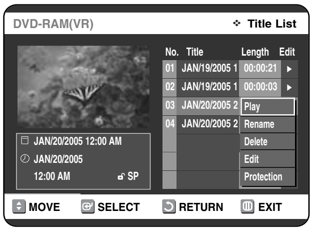
No.	Title	Length	Edit
01	JAN/19/2005 1	00:00:21	►
02	JAN/19/2005 1	00:00:03	►
03	JAN/20/2005 1	00:00:15	►
04	JAN/20/2005 1	00:00:16	►

JAN/19/2005 12:00 AM
JAN/19/2005
12:00 AM SP

MOVE
SELECT
RETURN
EXIT

---

3 Press the ▲▼ buttons to select a Title, then press the **ENTER** or ► button.
The Edit menu is displayed:Play, Rename, Delete, Edit, Protection(See pages 69~72)



DVD-RAM(VR) ❖ Title List

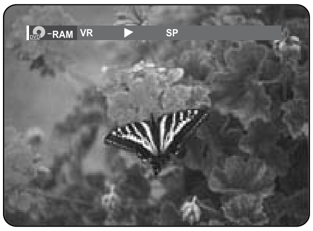
No.	Title	Length	Edit
01	JAN/19/2005 1	00:00:21	►
02	JAN/19/2005 1	00:00:03	►
03	JAN/20/2005 2		
04	JAN/20/2005 2		

JAN/20/2005 12:00 AM
JAN/20/2005
12:00 AM SP

Play
Rename
Delete
Edit
Protection
MOVE
SELECT
RETURN
EXIT

---

4 Press the ▲▼ buttons to select **Play** to play the title list, then press the **ENTER** button.
The selected title will be played back.

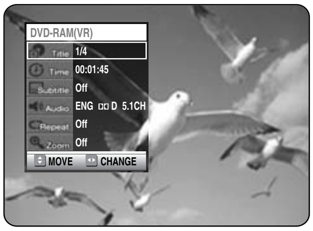


---

5 Press the **STOP** button to stop playing.
To return the title list screen, press the **TITLE LIST** button.

Note

- You can also play a recorded program by pressing the **ANYKEY** button.

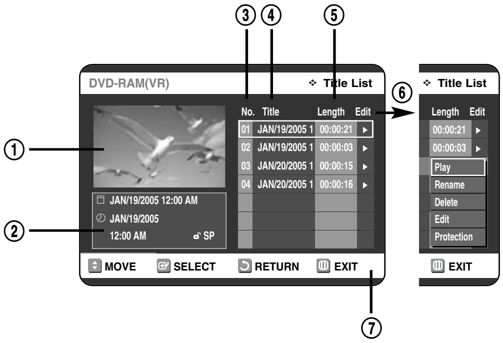


DVD-RAM(VR)
Title 1/4
Time 00:01:45
Subtitle Off
Audio ENG D 5.1CH
Repeat Off
Zoom Off

MOVE
CHANGE

- Press the ▲▼ buttons to select **Title**.
- Press the ◄ ► buttons to select to play the title list, then press the **ENTER** button.

Title List Screen Elements



③
④
⑤
⑥
①
②
⑦
DVD-RAM(VR)
❖ Title List
No. Title Length Edit
01 JAN/19/2005 1 00:00:21
02 JAN/19/2005 1 00:00:03
03 JAN/20/2005 1 00:00:15
04 JAN/20/2005 1 00:00:16
JAN/19/2005 12:00 AM
JAN/19/2005
12:00 AM SP
MOVE
SELECT
RETURN
EXIT
❖ Title List
Length Edit
00:00:21
00:00:03
Play
Rename
Delete
Edit
Protection
EXIT

① Playback screen for recorded titles.
② Information window for the selected title: Title name, recording date, recording time, lock status, recording mode
③ Recorded title No.
④ Recorded title name
⑤ Recording Length (i.e., the playing time)
⑥ Edit menu
Play: Plays the selected title.
Rename: Renames the title of a selected title.
Delete: Deletes the selected title from the list.
Edit: Deletes a section of title.
Protection: Locks or unlocks the selected title.
⑦ Button display.

Note

- This may depend on the disc type.
- DVD-R/DVD-RW(Video) has limited editing function.

Basic Editing (Title List)

Renaming(Labeling) a Title

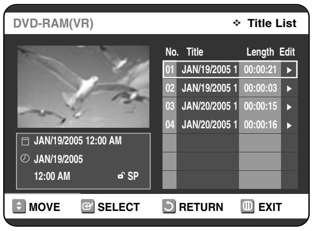
Follow these instructions to rename a title list name, i.e., to edit the title of a recorded program.

DVD-RAM DVD-RW DVD-R

1 Press the **TITLE LIST** button.
The Title List screen is displayed.

Using the **MENU** button.

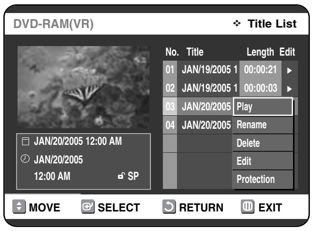
- Press the **MENU** button.
- Press the ▲▼ buttons to select **Title List**, then press the **ENTER** or ▶ button twice.


DVD-RAM(VR)
Title List
MOVE
SELECT
RETURN
EXIT

No.	Title	Length	Edit
01	JAN/19/2005 1	00:00:21	▶
02	JAN/19/2005 1	00:00:03	▶
03	JAN/20/2005 1	00:00:15	▶
04	JAN/20/2005 1	00:00:16	▶

JAN/19/2005 12:00 AM
JAN/19/2005
12:00 AM SP

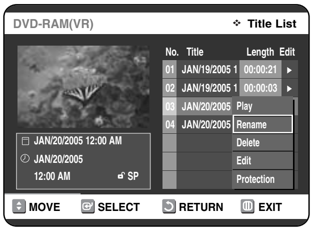
2 Press the ▲▼ buttons to select a title you want to rename from the Title List, then press the **ENTER** or ▶ button.


DVD-RAM(VR)
Title List
Play
Rename
Delete
Edit
Protection
MOVE
SELECT
RETURN
EXIT

No.	Title	Length	Edit
01	JAN/19/2005 1	00:00:21	▶
02	JAN/19/2005 1	00:00:03	▶
03	JAN/20/2005		
04	JAN/20/2005		

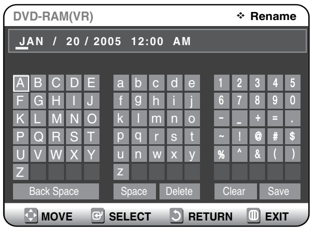
JAN/20/2005 12:00 AM
JAN/20/2005
12:00 AM SP

3 Press the ▲▼ buttons to select **Rename**, then press the **ENTER** or ▶ button.
The Rename screen is displayed.


DVD-RAM(VR)
Title List
Play
Rename
Delete
Edit
Protection
MOVE
SELECT
RETURN
EXIT

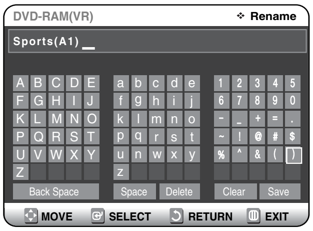
No.	Title	Length	Edit
01	JAN/19/2005 1	00:00:21	▶
02	JAN/19/2005 1	00:00:03	▶
03	JAN/20/2005		
04	JAN/20/2005		

JAN/20/2005 12:00 AM
JAN/20/2005
12:00 AM SP


DVD-RAM(VR)
Rename
A B C D E a b c d e 1 2 3 4 5
F G H I J f g h i j 6 7 8 9 0
K L M N O k l m n o - _ + = .
P Q R S T p q r s t ~ ! @ # $
U V W X Y u n w x y % ^ & ( )
Z z
Back Space
Space
Delete
Clear
Save
MOVE
SELECT
RETURN
EXIT

JAN / 20 / 2005 12:00 AM

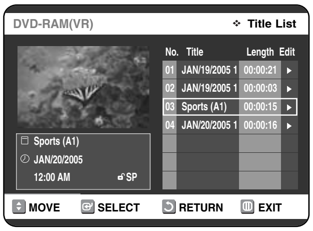
4 Select the desired characters using the ▲▼ ◀ ▶ buttons, press the **ENTER** button.


DVD-RAM(VR)
Rename
A B C D E a b c d e 1 2 3 4 5
F G H I J f g h i j 6 7 8 9 0
K L M N O k l m n o - _ + = .
P Q R S T p q r s t ~ ! @ # $
U V W X Y u n w x y % ^ & ( )
Z z
Back Space
Space
Delete
Clear
Save
MOVE
SELECT
RETURN
EXIT

Sports(A1)

- **Back Space:** Moves the cursor one position backwards.(Equivalent to the **CLEAR** button)
- **Space:** Enters a blank and moves the cursor one forward (to the right).
- **Delete:** Deletes the character at the cursor position.
- **Clear:** Deletes all the character inputs.
- **Save:** Registers the character inputs.

5 Press the ▲▼ ◀ ▶ buttons to select Save, and then press the **ENTER** button.
The changed title name is displayed in the title field of the selected title.


DVD-RAM(VR)
Title List
MOVE
SELECT
RETURN
EXIT

No.	Title	Length	Edit
01	JAN/19/2005 1	00:00:21	▶
02	JAN/19/2005 1	00:00:03	▶
03	Sports (A1)	00:00:15	▶
04	JAN/20/2005 1	00:00:16	▶

Sports (A1)
JAN/20/2005
12:00 AM SP

Locking(Protecting) a Title

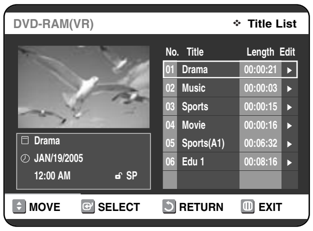
Follow these instructions to lock a title to protect it from accidental deletion.

DVD-RAM DVD-RW DVD-R

1 Press the **TITLE LIST** button.
The Title List screen is displayed.

Using the **MENU** button.

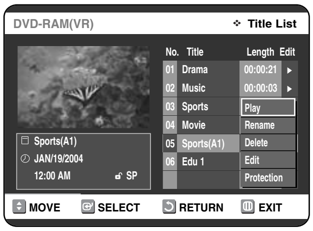
- Press the **MENU** button.
- Press the ▲▼ buttons to select **Title List**, then press the **ENTER** or ▶ button twice.


DVD-RAM(VR)
Title List
MOVE
SELECT
RETURN
EXIT

Drama
JAN/19/2005
12:00 AM SP

No.	Title	Length	Edit
01	Drama	00:00:21	▶
02	Music	00:00:03	▶
03	Sports	00:00:15	▶
04	Movie	00:00:16	▶
05	Sports(A1)	00:06:32	▶
06	Edu 1	00:08:16	▶

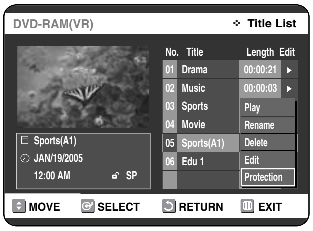
2 Press the ▲▼ buttons to select a title you want to protect in the Title List, then press the **ENTER** or ▶ button.


DVD-RAM(VR)
Title List
Play
Rename
Delete
Edit
Protection
MOVE
SELECT
RETURN
EXIT

Sports(A1)
JAN/19/2004
12:00 AM SP

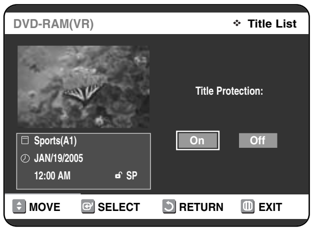
No.	Title	Length	Edit
01	Drama	00:00:21	▶
02	Music	00:00:03	▶
03	Sports		
04	Movie		
05	Sports(A1)		
06	Edu 1		

3 Press the ▲▼ buttons to select **Protection**, then press the **ENTER** or ▶ button.


DVD-RAM(VR)
Title List
Play
Rename
Delete
Edit
Protection
MOVE
SELECT
RETURN
EXIT

Sports(A1)
JAN/19/2005
12:00 AM SP

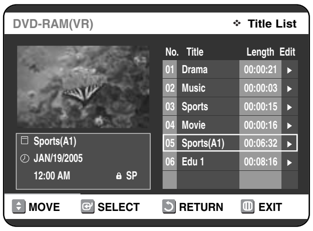
No.	Title	Length	Edit
01	Drama	00:00:21	▶
02	Music	00:00:03	▶
03	Sports		
04	Movie		
05	Sports(A1)		
06	Edu 1		


DVD-RAM(VR)
Title List
On
Off
MOVE
SELECT
RETURN
EXIT

Sports(A1)
JAN/19/2005
12:00 AM SP

Title Protection:

4 Press the ◀ ▶ buttons to select **On**, then press the **ENTER** button. The key icon on the information window for the selected title changes to the locked status. (🔓→🔒)


DVD-RAM(VR)
Title List
MOVE
SELECT
RETURN
EXIT

Sports(A1)
JAN/19/2005
12:00 AM 🔒 SP

No.	Title	Length	Edit
01	Drama	00:00:21	▶
02	Music	00:00:03	▶
03	Sports	00:00:15	▶
04	Movie	00:00:16	▶
05	Sports(A1)	00:06:32	▶
06	Edu 1	00:08:16	▶

Deleting a Title

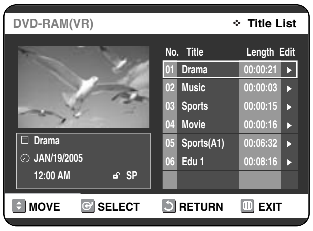
Follow these instructions to delete a title from the Title List.

DVD-RAM DVD-RW DVD-R

1 Press the **TITLE LIST** button.
The Title List screen is displayed.

Using the **MENU** button.

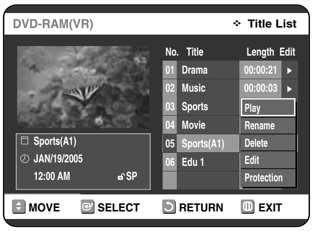
- Press the **MENU** button.
- Press the ▲▼ buttons to select **Title List**, then press the **ENTER** or ▶ button twice.


DVD-RAM(VR)
Title List
MOVE
SELECT
RETURN
EXIT

Drama
JAN/19/2005
12:00 AM SP

No.	Title	Length	Edit
01	Drama	00:00:21	▶
02	Music	00:00:03	▶
03	Sports	00:00:15	▶
04	Movie	00:00:16	▶
05	Sports(A1)	00:06:32	▶
06	Edu 1	00:08:16	▶

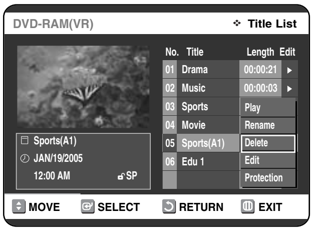
2 Press the ▲▼ buttons to select a title you want to delete in the Title List, then press the **ENTER** or ▶ button.


DVD-RAM(VR)
Title List
Play
Rename
Delete
Edit
Protection
MOVE
SELECT
RETURN
EXIT

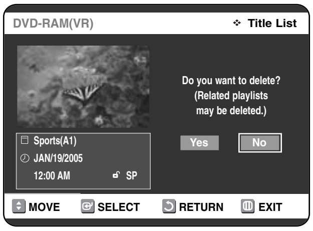
Sports(A1)
JAN/19/2005
12:00 AM SP

No.	Title	Length	Edit
01	Drama	00:00:21	▶
02	Music	00:00:03	▶
03	Sports		
04	Movie		
05	Sports(A1)		
06	Edu 1		

3 Press the ▲▼ buttons to select **Delete**, then press the **ENTER** or ▶ button.


DVD-RAM(VR)
Title List
No. Title Length Edit
01 Drama 00:00:21
02 Music 00:00:03
03 Sports
04 Movie
05 Sports(A1)
06 Edu 1
Play
Rename
Delete
Edit
Protection
Sports(A1)
JAN/19/2005
12:00 AM SP
MOVE SELECT RETURN EXIT

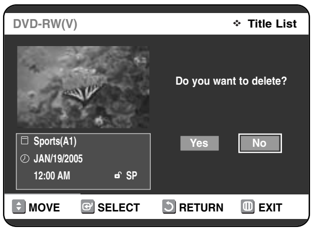
You will be prompted with a confirmation message.
DVD-RAM(VR), DVD-RW(VR mode): Since Playlist is present, the message 'Do you want to delete?(Related playlists may be deleted.)' is displayed.



Do you want to delete?
(Related playlists may be deleted.)

DVD-RAM(VR)
Title List
Yes
No
Sports(A1)
JAN/19/2005
12:00 AM SP
MOVE SELECT RETURN EXIT

DVD-RW(Video mode), DVD-R: Since Playlist is not present, the message 'Do you want to delete?' is displayed.



Do you want to delete?

DVD-RW(V)
Title List
Yes
No
Sports(A1)
JAN/19/2005
12:00 AM SP
MOVE SELECT RETURN EXIT

- The message may depend on the type of disc.

4 Press the ◀ ▶ buttons to select **Yes**, then press the **ENTER** button.

Note

- ■ You cannot delete a protected title.
  If you want to delete a protected title, select **Off** in the Title Protection menu.
- ■ Once a title is deleted from the Title List it cannot be recovered.
- ■ Once DVD-R, DVD-RW is finalized, it cannot be deleted.
- ■ With DVD-R, titles are only deleted from the menu, however, the Title remains physically on the disc.

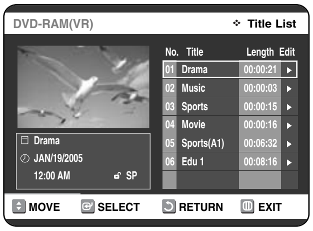
Deleting a Section of a Title

Follow these instructions to delete a section of a Title List title.

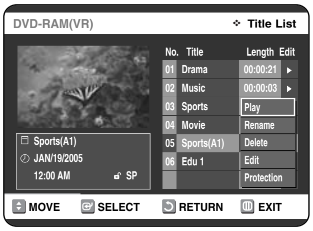
DVD-RAM DVD-RW (VR mode)

1 Press the **TITLE LIST** button.
The Title List screen is displayed.

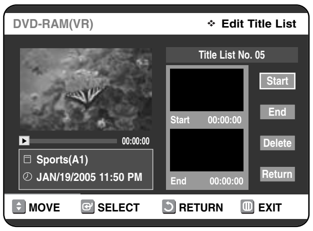
Using the **MENU** button.
- Press the **MENU** button.
- Press the ▲▼ buttons to select **Title List**, then press the **ENTER** or ▶ button twice.


DVD-RAM(VR)
Title List
No. Title Length Edit
01 Drama 00:00:21
02 Music 00:00:03
03 Sports 00:00:15
04 Movie 00:00:16
05 Sports(A1) 00:06:32
06 Edu 1 00:08:16
Drama
JAN/19/2005
12:00 AM SP
MOVE SELECT RETURN EXIT

2 Press the ▲▼ buttons to select a title you want to delete from the Title List, then press the **ENTER** or ▶ button.


DVD-RAM(VR)
Title List
No. Title Length Edit
01 Drama 00:00:21
02 Music 00:00:03
03 Sports
04 Movie
05 Sports(A1)
06 Edu 1
Play
Rename
Delete
Edit
Protection
Sports(A1)
JAN/19/2005
12:00 AM SP
MOVE SELECT RETURN EXIT

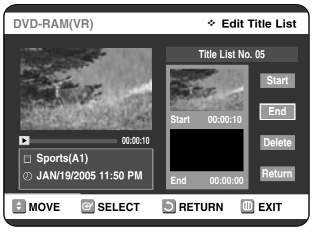
3 Press the ▲▼ buttons to select **Edit**, then press the **ENTER** or ▶ button.
The Edit Title List screen is displayed.

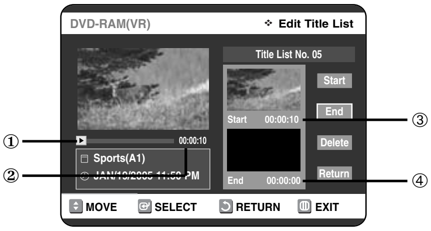

DVD-RAM(VR)
Edit Title List
Title List No. 05
Start
End
Delete
Return
Start 00:00:00
End 00:00:00
00:00:00
Sports(A1)
JAN/19/2005 11:50 PM
MOVE SELECT RETURN EXIT

Editing

4 Press the **ENTER** button at the starting point.
The image and starting point time are displayed in the section deletion starting point window.

Edit Title List Screen Elements

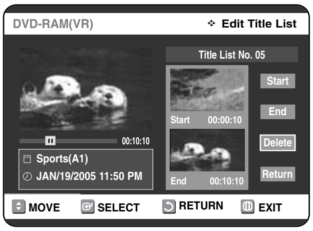

DVD-RAM(VR)
Edit Title List
Title List No. 05
Start
End
Delete
Return
00:00:10
Start 00:00:10
End 00:00:00
Sports(A1)
JAN/19/2005 11:50 PM
MOVE
SELECT
RETURN
EXIT


DVD-RAM(VR)
Edit Title List
Title List No. 05
Start
End
Delete
Return
00:00:10
Start 00:00:10
End 00:00:00
Sports(A1)
JAN/19/2005 11:50 PM
MOVE
SELECT
RETURN
EXIT
①
②
③
④

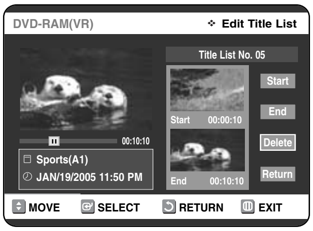
1 Playback bar
2 Playtime
3 Section deletion starting point window and time
4 Section deletion end point window and time

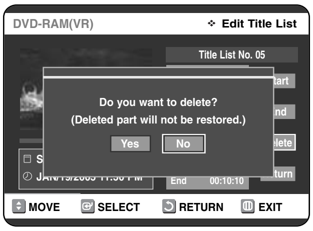
- Select the start and end points of the section you want to delete using the playback related buttons.
- Playback related buttons:
  (▶II,I◀◀,◀◀,▶▶).

5 Press the **ENTER** button at the end point.
The image and end point time are displayed in the Section deletion ending point window.


DVD-RAM(VR)
Edit Title List
Title List No. 05
Start
End
Delete
Return
00:10:10
Start 00:00:10
End 00:10:10
Sports(A1)
JAN/19/2005 11:50 PM
MOVE
SELECT
RETURN
EXIT

6 Press the ▲▼ buttons to select **Delete**, then press the **ENTER** button.


DVD-RAM(VR)
Edit Title List
Title List No. 05
Start
End
Delete
Return
00:10:10
Start 00:00:10
End 00:10:10
Sports(A1)
JAN/19/2005 11:50 PM
MOVE
SELECT
RETURN
EXIT


Do you want to delete?
(Deleted part will not be restored.)
DVD-RAM(VR)
Edit Title List
Title List No. 05
Yes
No
End 00:10:10
MOVE
SELECT
RETURN
EXIT

7 Press the ◀ ▶ buttons to select **YES**, then press the **ENTER** button.
The selected section has been deleted.
To return to the Title List screen, press the ▲▼ buttons to select Return.

Note

- ■ The length of the section to be deleted must be at least 5 seconds long.
- ■ If the length of the section to be deleted is less than 5 seconds, you will be prompted with the message 'The range is too short.'.
- ■ If the end time precedes the starting time, you will be prompted with the message ‘End point cannot be marked earlier than start point’.
- ■ The section cannot be deleted when it includes a still picture.
- ■ Press the **MENU** button after the operation has finished.
  The Title List screen will disappear.

Advanced Editing (Playlist)

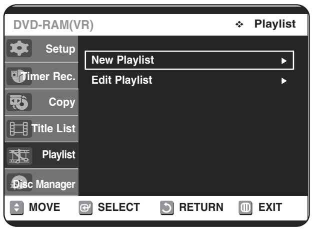
Creating a Playlist

Follow these instructions to create a new playlist title from a recorded title.

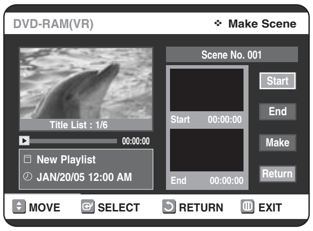
DVD-RAM DVD-RW (VR mode)

1 With the unit in Stop mode, press the **MENU** button.

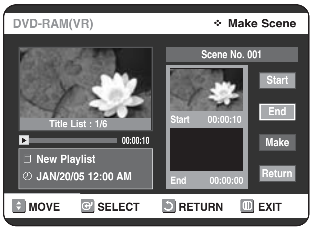
2 Press the ▲▼ buttons to select **Playlist**, then press the **ENTER** or ► button.


DVD-RAM(VR)
Playlist
Setup
Timer Rec.
Copy
Title List
Playlist
Disc Manager
New Playlist ►
Edit Playlist ►
MOVE
SELECT
RETURN
EXIT

3 Press the ▲▼ buttons to select **New Playlist**, then press the **ENTER** or ► button.
The Make Scene screen is displayed.

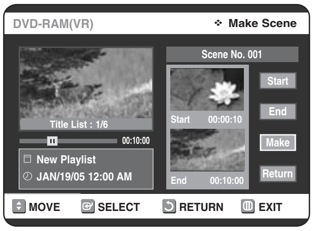

DVD-RAM(VR)
Make Scene
Title List : 1/6
00:00:00
New Playlist
JAN/20/05 12:00 AM
Scene No. 001
Start 00:00:00
End 00:00:00
Start
End
Make
Return
MOVE
SELECT
RETURN
EXIT

4 Press the **ENTER** button at the start point.


DVD-RAM(VR)
Make Scene
Title List : 1/6
00:00:10
New Playlist
JAN/20/05 12:00 AM
Scene No. 001
Start 00:00:10
End 00:00:00
Start
End
Make
Return
MOVE
SELECT
RETURN
EXIT

- The image and time at the start point are displayed on the Start window.
- The yellow-colored selection bar moves to the End item.
- Select the starting point of the section from which you want to create a new scene using the playback related buttons (►II,I◄◄,►►I,◄◄,►►).

5 Press the **ENTER** button at the end point.


DVD-RAM(VR)
Make Scene
Title List : 1/6
00:10:00
New Playlist
JAN/19/05 12:00 AM
Scene No. 001
Start 00:00:10
End 00:10:00
Start
End
Make
Return
MOVE
SELECT
RETURN
EXIT

- The image and end point time are displayed in the End window.
- The yellow-colored selection bar moves to the Make icon.

- To make a new playlist -

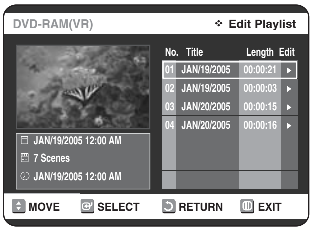
6 Press the ▲▼ buttons to select **Make**, then press the **ENTER** button.
A new Scene will be added to the current Playlist.
A new Make Scene screen is displayed.

Note

- ■ You can check and see all the scenes on Edit Playlist screen.
- ■ Repeat steps 1~6 if you want to make a new playlist.
- ■ Repeat steps 3~6 if you want to make scenes of the playlist.

- To return to Edit Playlist menu -

7 Press the ▲▼ buttons to select **Return**, then press the **ENTER** button.
The Edit Playlist screen is displayed.


DVD-RAM(VR)
Edit Playlist
JAN/19/2005 12:00 AM
7 Scenes
JAN/19/2005 12:00 AM
MOVE
SELECT
RETURN
EXIT

No.	Title	Length	Edit
01	JAN/19/2005	00:00:21	►
02	JAN/19/2005	00:00:03	►
03	JAN/20/2005	00:00:15	►
04	JAN/20/2005	00:00:16	►

8 Press the **MENU** or **PLAY LIST** button after the operation has finished.
The Edit Playlist screen will disappear.

Note

- ■ You can create up to 99 playlist titles.
- ■ Depending on the kind of disc, the displayed screen may have a slight difference.

Playing Titles in the Playlist

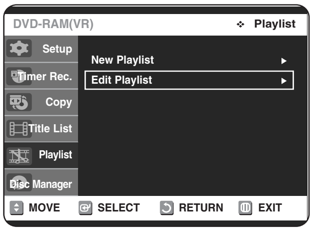
Follow these instructions to play the playlist titles.

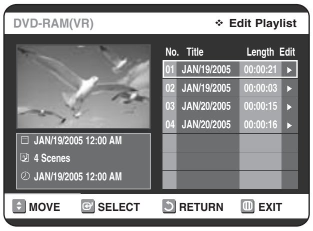
DVD-RAM DVD-RW (VR mode)

1 Press the **PLAY LIST** button with the disc stopped. The Edit Playlist screen is displayed.

Using the MENU button.

- Press the **MENU** button with the disc stopped.
- Press the ▲▼ buttons to select **Playlist**, then press the **ENTER** or ▶ button.
- Press the ▲▼ buttons to select **Edit Playlist**, then press the **ENTER** or ▶ button.


DVD-RAM(VR)
Playlist
Setup
Timer Rec.
Copy
Title List
Playlist
Disc Manager
New Playlist
Edit Playlist
MOVE
SELECT
RETURN
EXIT

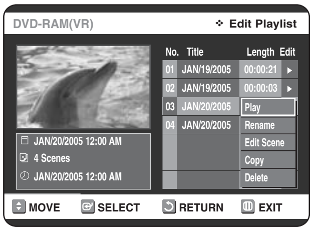

DVD-RAM(VR)
Edit Playlist
MOVE
SELECT
RETURN
EXIT

JAN/19/2005 12:00 AM
4 Scenes
JAN/19/2005 12:00 AM

No.	Title	Length	Edit
01	JAN/19/2005	00:00:21	▶
02	JAN/19/2005	00:00:03	▶
03	JAN/20/2005	00:00:15	▶
04	JAN/20/2005	00:00:16	▶

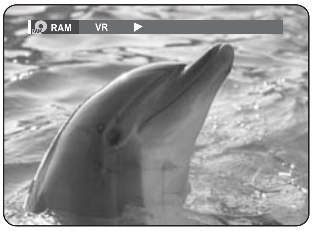
2 Press the ▲▼ buttons to select the title you want to play from the Playlist, then press the **ENTER** or ▶ button.
The Edit Playlist menu is displayed : Play, Rename, Edit Scene, Copy, Delete.

3 Press the ▲▼ buttons to select **Play**, then press the **ENTER** or ▶ button.
The playlist titles will be played back.


DVD-RAM(VR)
Edit Playlist
Play
Rename
Edit Scene
Copy
Delete
MOVE
SELECT
RETURN
EXIT

JAN/20/2005 12:00 AM
4 Scenes
JAN/20/2005 12:00 AM

No.	Title	Length	Edit
01	JAN/19/2005	00:00:21	▶
02	JAN/19/2005	00:00:03	▶
03	JAN/20/2005		
04	JAN/20/2005		



4 Press the **STOP** button to stop playing.
The screen returns to the Edit Playlist screen.

Renaming a Playlist Title

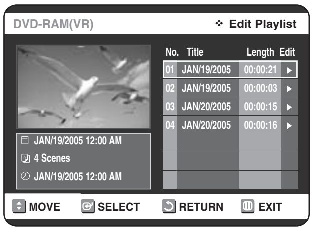
Follow these instructions to rename a playlist title, i.e. to edit the title of a playlist title.

DVD-RAM DVD-RW (VR mode)

1 Press the **PLAY LIST** button with the disc stopped. The Edit Playlist screen is displayed.

Using the MENU button.

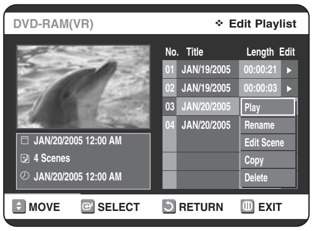
- Press the **MENU** button with the disc stopped.
- Press the ▲▼ buttons to select **Playlist**, then press the **ENTER** or ▶ button.
- Press the ▲▼ buttons to select **Edit Playlist**, then press the **ENTER** or ▶ button.


DVD-RAM(VR)
Edit Playlist
MOVE
SELECT
RETURN
EXIT

No.	Title	Length	Edit
01	JAN/19/2005	00:00:21	▶
02	JAN/19/2005	00:00:03	▶
03	JAN/20/2005	00:00:15	▶
04	JAN/20/2005	00:00:16	▶

JAN/19/2005 12:00 AM
4 Scenes
JAN/19/2005 12:00 AM

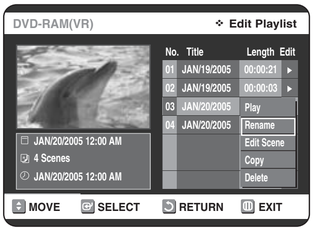
2 Press the ▲▼ buttons to select the title you want to rename from the Playlist, then press the **ENTER** or ▶ button.
The Edit menu is displayed :Play, Rename, Edit Scene, Copy, Delete


DVD-RAM(VR)
Edit Playlist
Play
Rename
Edit Scene
Copy
Delete
MOVE
SELECT
RETURN
EXIT

No.	Title	Length	Edit
01	JAN/19/2005	00:00:21	▶
02	JAN/19/2005	00:00:03	▶
03	JAN/20/2005		
04	JAN/20/2005		

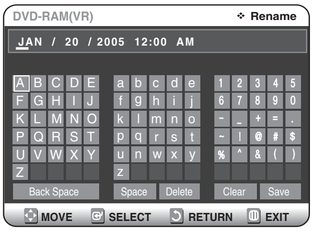
JAN/20/2005 12:00 AM
4 Scenes
JAN/20/2005 12:00 AM

3 Press the ▲▼ buttons to select **Rename**, then press the **ENTER** or ▶ button.
The Rename screen is displayed.


DVD-RAM(VR)
Edit Playlist
Play
Rename
Edit Scene
Copy
Delete
MOVE
SELECT
RETURN
EXIT

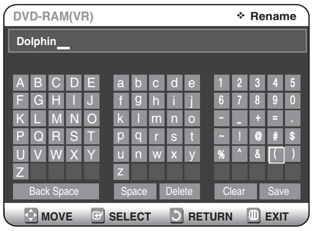
No.	Title	Length	Edit
01	JAN/19/2005	00:00:21	▶
02	JAN/19/2005	00:00:03	▶
03	JAN/20/2005		
04	JAN/20/2005		

JAN/20/2005 12:00 AM
4 Scenes
JAN/20/2005 12:00 AM


DVD-RAM(VR)
Rename
A B C D E a b c d e 1 2 3 4 5
F G H I J f g h i j 6 7 8 9 0
K L M N O k l m n o - _ + = .
P Q R S T p q r s t ~ ! @ # $
U V W X Y u n w x y % ^ & ( )
Z z
Back Space
Space
Delete
Clear
Save
MOVE
SELECT
RETURN
EXIT

JAN / 20 / 2005 12:00 AM

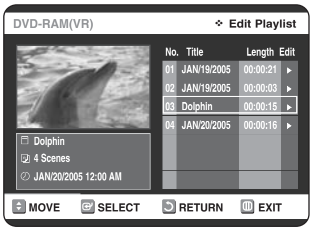
4 Enter the desired characters using the ▲▼ ◀ ▶ buttons.


DVD-RAM(VR)
Rename
A B C D E a b c d e 1 2 3 4 5
F G H I J f g h i j 6 7 8 9 0
K L M N O k l m n o - _ + = .
P Q R S T p q r s t ~ ! @ # $
U V W X Y u n w x y % ^ & ( )
Z z
Back Space
Space
Delete
Clear
Save
MOVE
SELECT
RETURN
EXIT

Dolphin_

- This function is the same as the Rename function in renaming the title list. (See page 65.)
- The maximum number of characters that can be entered is 31.

5 Press the ▲▼ ◀ ▶ buttons to select Save, then press the **ENTER** button.
The changed title is displayed in the title field of the selected title.


DVD-RAM(VR)
Edit Playlist
MOVE
SELECT
RETURN
EXIT

No.	Title	Length	Edit
01	JAN/19/2005	00:00:21	▶
02	JAN/19/2005	00:00:03	▶
03	Dolphin	00:00:15	▶
04	JAN/20/2005	00:00:16	▶

Dolphin
4 Scenes
JAN/20/2005 12:00 AM

Editing a Scene for the Playlist

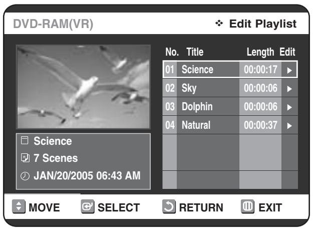
Follow these instructions to edit scenes for a playlist.

DVD-RAM DVD-RW (VR mode)

1 Press the **PLAY LIST** button with the disc stopped.
The Edit Playlist screen is displayed.

Using the MENU button.

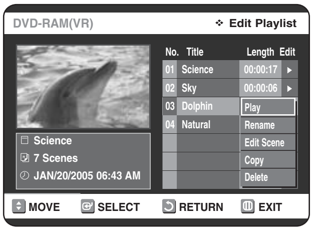
- Press the **MENU** button with the disc stopped.
- Press the ▲▼ buttons to select **Playlist**, then press the **ENTER** or ▶ button.
- Press the ▲▼ buttons to select **Edit Playlist**, then press the **ENTER** or ▶ button.


DVD-RAM(VR)
Edit Playlist
MOVE
SELECT
RETURN
EXIT

No.	Title	Length	Edit
01	Science	00:00:17	▶
02	Sky	00:00:06	▶
03	Dolphin	00:00:06	▶
04	Natural	00:00:37	▶

Science
7 Scenes
JAN/20/2005 06:43 AM

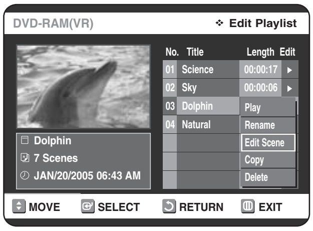
2 Press the ▲▼ buttons to select the title you want to edit from the Playlist, and then press the **ENTER** or ▶ button.
The Edit Playlist menu is displayed:Play, Rename, Edit Scene, Copy, Delete


DVD-RAM(VR)
Edit Playlist
Play
Rename
Edit Scene
Copy
Delete
MOVE
SELECT
RETURN
EXIT

No.	Title	Length	Edit
01	Science	00:00:17	▶
02	Sky	00:00:06	▶
03	Dolphin		
04	Natural		

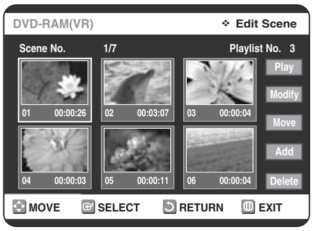
Science
7 Scenes
JAN/20/2005 06:43 AM

3 Press the ▲▼ buttons to select **Edit Scene**, then press the **ENTER** or ▶ button.
The Edit Scene screen is displayed.


DVD-RAM(VR)
Edit Playlist
Play
Rename
Edit Scene
Copy
Delete
MOVE
SELECT
RETURN
EXIT

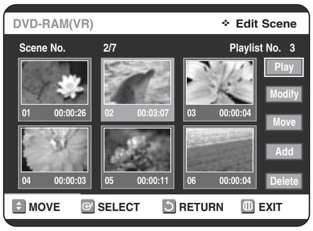
No.	Title	Length	Edit
01	Science	00:00:17	▶
02	Sky	00:00:06	▶
03	Dolphin		
04	Natural		

Dolphin
7 Scenes
JAN/20/2005 06:43 AM


DVD-RAM(VR)
Edit Scene
Scene No. 1/7
Playlist No. 3
01 00:00:26
02 00:03:07
03 00:00:04
04 00:00:03
05 00:00:11
06 00:00:04
Play
Modify
Move
Add
Delete
MOVE
SELECT
RETURN
EXIT

Playing a Selected Scene

4 Press the ▲▼◀ ▶ buttons to select the scene you want to play, then press the **ENTER** button.
The playlist title to be played is selected.


DVD-RAM(VR)
Edit Scene
Scene No. 2/7
Playlist No. 3
01 00:00:26
02 00:03:07
03 00:00:04
04 00:00:03
05 00:00:11
06 00:00:04
Play
Modify
Move
Add
Delete
MOVE
SELECT
RETURN
EXIT

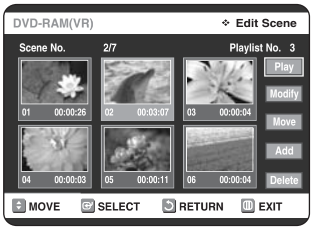
5 Press the **ENTER** button.
The selected scene will be played back.

- To stop scene play, press the **STOP** button.

Modifying a Scene (Replacing a Scene)

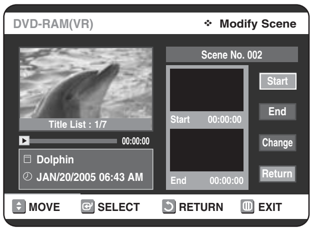
To setup, follow steps 1 to 3 in page 72.

4 Press the ▲▼ ◀ ▶ buttons to select the scene you want to modify, then press the **ENTER** button.


DVD-RAM(VR)
Edit Scene
Scene No. 2/7
Playlist No. 3
01 00:00:26
02 00:03:07
03 00:00:04
04 00:00:03
05 00:00:11
06 00:00:04
Play
Modify
Move
Add
Delete
MOVE
SELECT
RETURN
EXIT

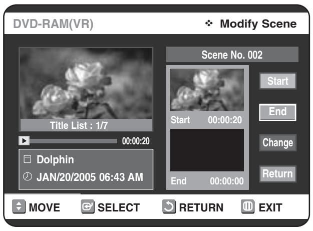
---

5 Press the ▲▼ buttons to select **Modify**, then press the **ENTER** button.
The Modify Scene screen is displayed.


DVD-RAM(VR)
Modify Scene
Title List : 1/7
00:00:00
Dolphin
JAN/20/2005 06:43 AM
Scene No. 002
Start 00:00:00
End 00:00:00
Start
End
Change
Return
MOVE
SELECT
RETURN
EXIT

---

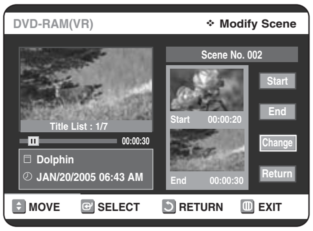
6 Press the **ENTER** button at the start point of the scene.


DVD-RAM(VR)
Modify Scene
Title List : 1/7
00:00:20
Dolphin
JAN/20/2005 06:43 AM
Scene No. 002
Start 00:00:20
End 00:00:00
Start
End
Change
Return
MOVE
SELECT
RETURN
EXIT

- The image and starting point time are displayed on the Start window.
- Select the starting or ending point of the section you want to modify using the playback related buttons (▶II,I◀◀,▶▶I,◀◀,▶▶).

---

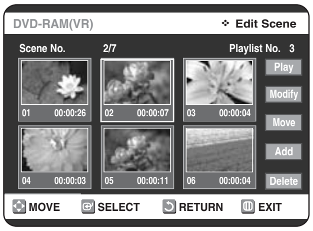
7 Press the **ENTER** button at the end point of the scene.


DVD-RAM(VR)
Modify Scene
Title List : 1/7
00:00:30
Dolphin
JAN/20/2005 06:43 AM
Scene No. 002
Start 00:00:20
End 00:00:30
Start
End
Change
Return
MOVE
SELECT
RETURN
EXIT

- The image and ending point time are displayed in the End window.

---

8 Press the ▲▼ buttons to select **Change**, then press the **ENTER** button.

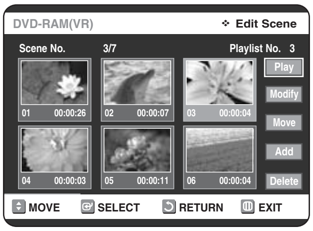

DVD-RAM(VR)
Edit Scene
Scene No. 2/7
Playlist No. 3
01 00:00:26
02 00:00:07
03 00:00:04
04 00:00:03
05 00:00:11
06 00:00:04
Play
Modify
Move
Add
Delete
MOVE
SELECT
RETURN
EXIT

- The scene you want to modify is changed with the selected section.

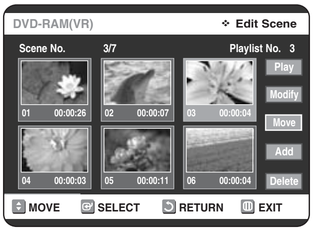
Moving a Scene (Changing the Position of a Scene)

To setup, follow steps 1 to 3 in page 72.

4 Press the ▲▼ ◀ ▶ buttons to select the scene you want to move (change the position), then press the **ENTER** button.

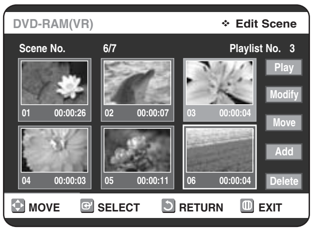

DVD-RAM(VR)
Edit Scene
Scene No. 3/7
Playlist No. 3
Play
Modify
Move
Add
Delete
01 00:00:26
02 00:00:07
03 00:00:04
04 00:00:03
05 00:00:11
06 00:00:04
MOVE
SELECT
RETURN
EXIT

5 Press the ▲▼ buttons to select **Move**, then press the **ENTER** button.

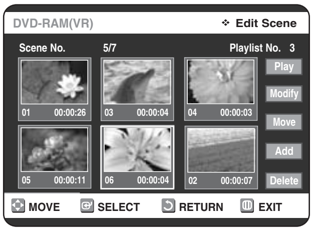

DVD-RAM(VR)
Edit Scene
Scene No. 3/7
Playlist No. 3
Play
Modify
Move
Add
Delete
01 00:00:26
02 00:00:07
03 00:00:04
04 00:00:03
05 00:00:11
06 00:00:04
MOVE
SELECT
RETURN
EXIT

- A yellow selection window is displayed on the scene to be moved.

6 Press the ▲▼ ◀ ▶ buttons to select the position to which you want to move the selected scene, then select the **ENTER** button.


DVD-RAM(VR)
Edit Scene
Scene No. 6/7
Playlist No. 3
Play
Modify
Move
Add
Delete
01 00:00:26
02 00:00:07
03 00:00:04
04 00:00:03
05 00:00:11
06 00:00:04
MOVE
SELECT
RETURN
EXIT

- The selected scene is moved to the selected position.


DVD-RAM(VR)
Edit Scene
Scene No. 5/7
Playlist No. 3
Play
Modify
Move
Add
Delete
01 00:00:26
03 00:00:04
04 00:00:03
05 00:00:11
06 00:00:04
02 00:00:07
MOVE
SELECT
RETURN
EXIT

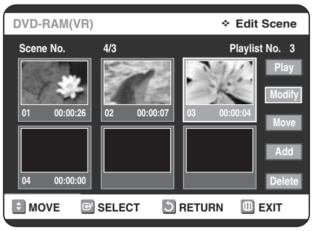
Note

- You cannot move the selected scene to the position of the next scene, because the selected scene should be inserted before that position, which requires no action.
- Depending on the kind of disc, the displayed screen may have a slight difference.

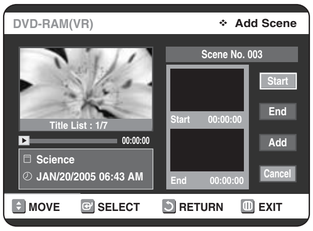
Adding a Scene

To setup, follow steps 1 to 3 in page 72.

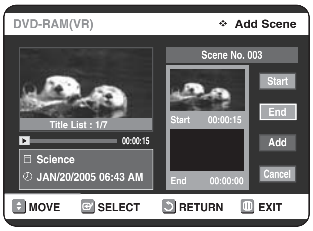
4 Press the ▲▼ ◀ ▶ buttons to select the scene that will have a new scene inserted before it, then press the **ENTER** button.
A yellow selection window is displayed on the scene to be added as the new scene.


DVD-RAM(VR)
Edit Scene
Scene No. 4/3
Playlist No. 3
Play
Modify
Move
Add
Delete
01 00:00:26
02 00:00:07
03 00:00:04
04 00:00:00
MOVE
SELECT
RETURN
EXIT

5 Press the ▲▼ buttons to select **add**, then press the **ENTER** button.
The Add Scene screen is displayed.

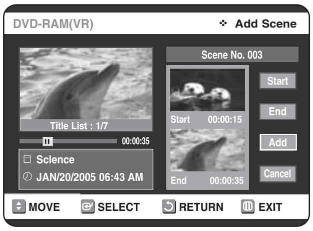

DVD-RAM(VR)
Add Scene
Scene No. 003
Title List : 1/7
00:00:00
Science
JAN/20/2005 06:43 AM
Start 00:00:00
End 00:00:00
Start
End
Add
Cancel
MOVE
SELECT
RETURN
EXIT

6 Press the **ENTER** button at the starting point of the scene.


DVD-RAM(VR)
Add Scene
Scene No. 003
Title List : 1/7
00:00:15
Science
JAN/20/2005 06:43 AM
Start 00:00:15
End 00:00:00
Start
End
Add
Cancel
MOVE
SELECT
RETURN
EXIT

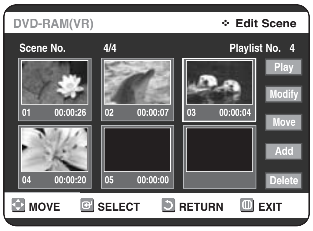
- The image and starting point time are displayed in the Start window.
- Select the end point of the section where you want to add the new scene using the playback related buttons (▶II,I◀◀,▶▶I,◀◀,▶▶).

7 Press the **ENTER** button at the end point of the scene.


DVD-RAM(VR)
Add Scene
Scene No. 003
Title List : 1/7
00:00:35
Science
JAN/20/2005 06:43 AM
Start 00:00:15
End 00:00:35
Start
End
Add
Cancel
MOVE
SELECT
RETURN
EXIT

- The image and time of the end point are displayed in the End window.
- To cancel, press the ▲▼ buttons to select cancel and then press the **ENTER** button.

8 Press the ▲▼ buttons to select **Add**, then press the **ENTER** button.

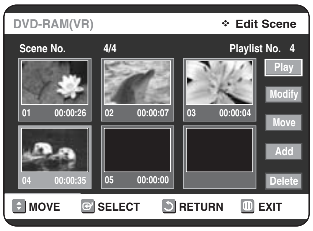

DVD-RAM(VR)
Edit Scene
Scene No. 4/4
Playlist No. 4
01 00:00:26
02 00:00:07
03 00:00:04
04 00:00:20
05 00:00:00
Play
Modify
Move
Add
Delete
MOVE
SELECT
RETURN
EXIT

- The section you want to add is inserted prior to the scene selected in step.

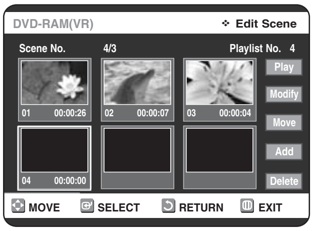
Deleting a Scene

To setup, follow steps 1 to 3 in page 72.

4 Press the ▲▼ ◀ ▶ buttons to select the scene you want to delete, and then press the **ENTER** button.


DVD-RAM(VR)
Edit Scene
Scene No. 4/4
Playlist No. 4
01 00:00:26
02 00:00:07
03 00:00:04
04 00:00:35
05 00:00:00
Play
Modify
Move
Add
Delete
MOVE
SELECT
RETURN
EXIT

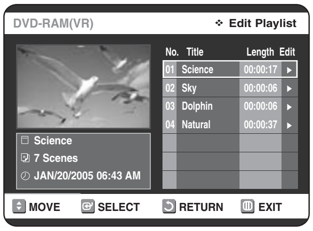
5 Press the ▲▼ buttons to select **Delete**, then press the **ENTER** button.


DVD-RAM(VR)
Edit Scene
Scene No. 4/3
Playlist No. 4
01 00:00:26
02 00:00:07
03 00:00:04
04 00:00:00
Play
Modify
Move
Add
Delete
MOVE
SELECT
RETURN
EXIT

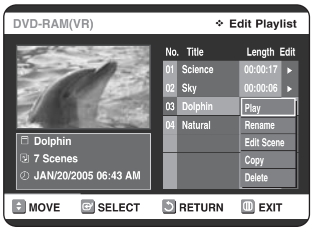
Copying a Playlist Title to the VCR

1 Press the **PLAY LIST** button with the disc stopped. The Edit Playlist screen is displayed.

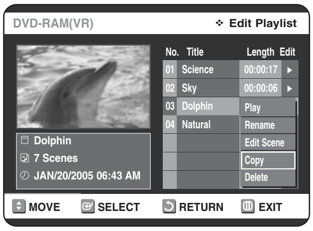
Using the MENU button.
- Press the **MENU** button with the disc stopped.
- Press the ▲▼ buttons to select **Playlist**, then press the **ENTER** or ▶ button.
- Press the ▲▼ buttons to select **Edit Playlist**, then press the **ENTER** or ▶ button.


DVD-RAM(VR)
Edit Playlist
No. Title Length Edit
01 Science 00:00:17
02 Sky 00:00:06
03 Dolphin 00:00:06
04 Natural 00:00:37
Science
7 Scenes
JAN/20/2005 06:43 AM
MOVE
SELECT
RETURN
EXIT

2 Press the ▲▼ buttons to select the title you want to copy to the VCR, and then press the **ENTER** or ▶ button.
The Edit Playlist menu is displayed:Play, Rename, Edit Scene, Copy, Delete.


DVD-RAM(VR)
Edit Playlist
No. Title Length Edit
01 Science 00:00:17
02 Sky 00:00:06
03 Dolphin
04 Natural
Play
Rename
Edit Scene
Copy
Delete
Dolphin
7 Scenes
JAN/20/2005 06:43 AM
MOVE
SELECT
RETURN
EXIT

3 Press the ▲▼ buttons to select **Copy**, then press the **ENTER** button.
- The title you choose is played and copied to VCR tape.


DVD-RAM(VR)
Edit Playlist
No. Title Length Edit
01 Science 00:00:17
02 Sky 00:00:06
03 Dolphin
04 Natural
Play
Rename
Edit Scene
Copy
Delete
Dolphin
7 Scenes
JAN/20/2005 06:43 AM
MOVE
SELECT
RETURN
EXIT

4 Press the **MENU** button after the operation has finished. The menu screen will disappear.

Note

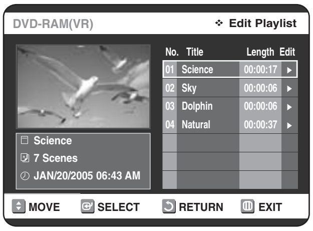
- The playlist can contain up to 99 playlist titles (titles).

Deleting a Playlist Title from the Playlist

1 Press the **PLAY LIST** button with the disc stopped. The Edit Playlist screen is displayed.

Using the MENU button.

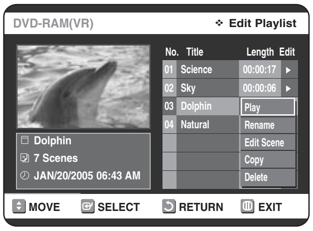
- Press the **MENU** button with the disc stopped.
- Press the ▲▼ buttons to select **Playlist**, then press the **ENTER** or ▶ button.
- Press the ▲▼ buttons to select **Edit Playlist**, then press the **ENTER** or ▶ button.


DVD-RAM(VR)
Edit Playlist
MOVE
SELECT
RETURN
EXIT

No.	Title	Length	Edit
01	Science	00:00:17	▶
02	Sky	00:00:06	▶
03	Dolphin	00:00:06	▶
04	Natural	00:00:37	▶

Science
7 Scenes
JAN/20/2005 06:43 AM

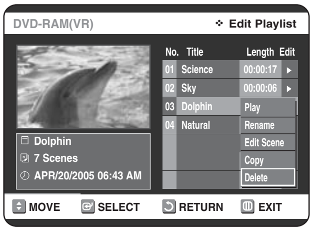
2 Press the ▲▼ buttons to select the title you want to delete from the Playlist, then press the **ENTER** or ▶ button. The Edit Playlist menu is displayed:Play, Rename, Edit Scene, Copy, Delete


DVD-RAM(VR)
Edit Playlist
Play
Rename
Edit Scene
Copy
Delete
MOVE
SELECT
RETURN
EXIT

No.	Title	Length	Edit
01	Science	00:00:17	▶
02	Sky	00:00:06	▶
03	Dolphin		
04	Natural		

Dolphin
7 Scenes
JAN/20/2005 06:43 AM

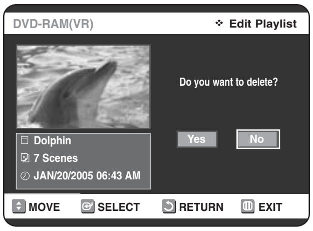
3 Press the ▲▼ buttons to select **Delete**, then press the **ENTER** button.


DVD-RAM(VR)
Edit Playlist
Play
Rename
Edit Scene
Copy
Delete
MOVE
SELECT
RETURN
EXIT

No.	Title	Length	Edit
01	Science	00:00:17	▶
02	Sky	00:00:06	▶
03	Dolphin		
04	Natural		

Dolphin
7 Scenes
APR/20/2005 06:43 AM

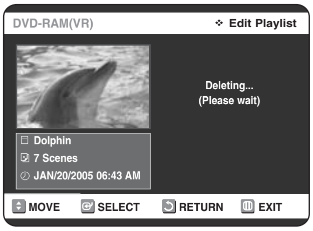
- You will be prompted with the delete confirmation message ‘Do you want to delete?.


DVD-RAM(VR)
Edit Playlist
Yes
No
MOVE
SELECT
RETURN
EXIT

Do you want to delete?

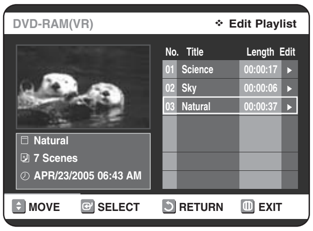
Dolphin
7 Scenes
JAN/20/2005 06:43 AM

4 Press the ◀ ▶ buttons to select **Yes**, then press the **ENTER** button. It automatically returned to the Edit Playlist screen after the delete operation has finished.


DVD-RAM(VR)
Edit Playlist
MOVE
SELECT
RETURN
EXIT

Deleting...
(Please wait)

Dolphin
7 Scenes
JAN/20/2005 06:43 AM


DVD-RAM(VR)
Edit Playlist
MOVE
SELECT
RETURN
EXIT

No.	Title	Length	Edit
01	Science	00:00:17	▶
02	Sky	00:00:06	▶
03	Natural	00:00:37	▶

Natural
7 Scenes
APR/23/2005 06:43 AM

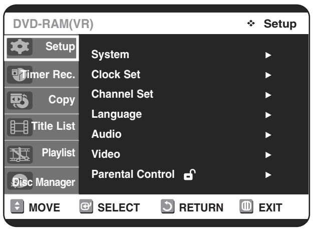
Disc Manager

Editing the Disc Name

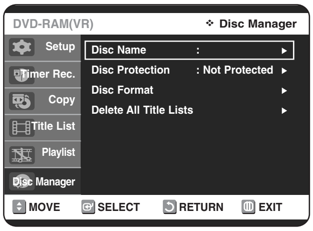
Follow these instructions to give a name to a disc.

DVD-RAM DVD-RW DVD-R

1 With the unit in Stop mode, press the **MENU** button.

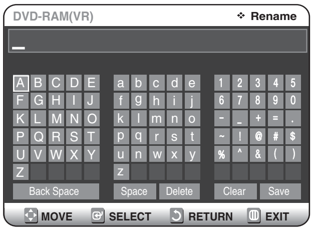

DVD-RAM(VR)
Setup
Setup
Timer Rec.
Copy
Title List
Playlist
Disc Manager
System
Clock Set
Channel Set
Language
Audio
Video
Parental Control
MOVE
SELECT
RETURN
EXIT

2 Press the ▲▼ buttons to select **Disc Manager**, then press the **ENTER** or ▶ button.

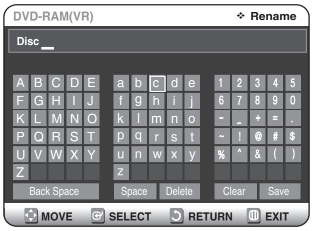

DVD-RAM(VR)
Disc Manager
Setup
Timer Rec.
Copy
Title List
Playlist
Disc Manager
Disc Name
Disc Format
Delete All Title Lists
MOVE
SELECT
RETURN
EXIT

Disc Name :
Disc Protection : Not Protected

3 Press the ▲▼ buttons to select **Disc Name**, then press the **ENTER** or ▶ button.
The Edit Name screen is displayed.


DVD-RAM(VR)
Rename
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
a b c d e f g h i j k l m n o p q r s t u v w x y z
1 2 3 4 5 6 7 8 9 0 - _ + = . ~ ! @ # $ % ^ & ( )
Back Space
Space
Delete
Clear
Save
MOVE
SELECT
RETURN
EXIT

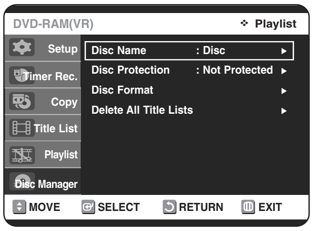
4 Enter the desired characters using the ▲▼ ◀ ▶ buttons.


DVD-RAM(VR)
Rename
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
a b c d e f g h i j k l m n o p q r s t u v w x y z
1 2 3 4 5 6 7 8 9 0 - _ + = . ~ ! @ # $ % ^ & ( )
Back Space
Space
Delete
Clear
Save
MOVE
SELECT
RETURN
EXIT

Disc _

- This function is the same as the Rename function in renaming the title list. (See page 65.)
- The maximum number of characters that can be entered is 31.

5 Press the ▲▼ ◀ ▶ buttons to select **Save**, then press the **ENTER** button.
A disc name is given to the disc.


DVD-RAM(VR)
Playlist
Setup
Timer Rec.
Copy
Title List
Playlist
Disc Manager
Disc Format
Delete All Title Lists
MOVE
SELECT
RETURN
EXIT

Disc Name : Disc
Disc Protection : Not Protected

Note

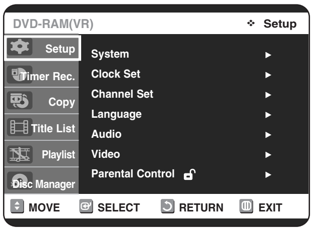
- ■ You may need to clear disc protection before beginning editing.(see page 78)
- ■ Depending on the kind of disc, the displayed screen may be different.

Disc Protection

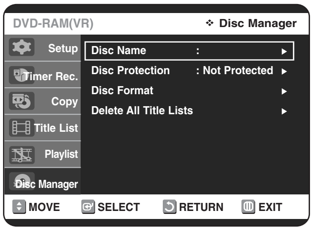
Disc Protect allows you to protect your discs from being formatted or deleted due to unintended operations.

DVD-RAM DVD-RW DVD-R

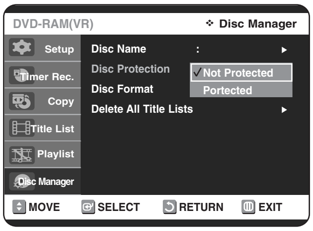
1 With the unit in Stop mode, press the **MENU** button.


DVD-RAM(VR)
Setup
Setup
Timer Rec.
Copy
Title List
Playlist
Disc Manager
System
Clock Set
Channel Set
Language
Audio
Video
Parental Control
MOVE
SELECT
RETURN
EXIT

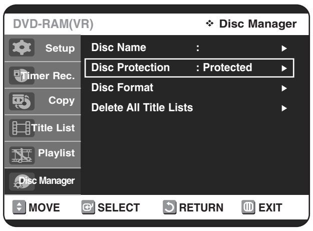
2 Press the ▲▼ buttons to select **Disc Manager**, then press the **ENTER** or ▶ button.


DVD-RAM(VR)
Disc Manager
Setup
Timer Rec.
Copy
Title List
Playlist
Disc Manager
Disc Name :
Disc Protection : Not Protected
Disc Format
Delete All Title Lists
MOVE
SELECT
RETURN
EXIT

3 Press the ▲▼ buttons to select **Disc Protection**, then press the **ENTER** or ▶ button.


DVD-RAM(VR)
Disc Manager
Setup
Timer Rec.
Copy
Title List
Playlist
Disc Manager
Disc Name :
Disc Protection
✓Not Protected
Portected
Disc Format
Delete All Title Lists
MOVE
SELECT
RETURN
EXIT

4 Press the ▲▼ button to select **Protected**, then press the **ENTER** or ▶ button.

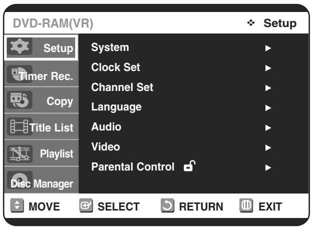

DVD-RAM(VR)
Disc Manager
Setup
Timer Rec.
Copy
Title List
Playlist
Disc Manager
Disc Name :
Disc Protection : Protected
Disc Format
Delete All Title Lists
MOVE
SELECT
RETURN
EXIT

Formatting a Disc

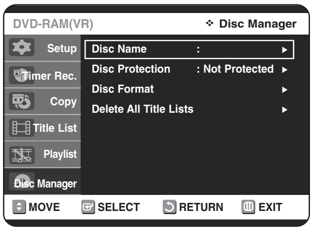
Use these instructions to format a disc.
The disc protect should be cleared

DVD-RAM DVD-RW

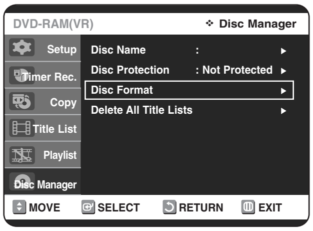
1 With the unit in Stop mode, press the **MENU** button.


DVD-RAM(VR)
Setup
Setup
Timer Rec.
Copy
Title List
Playlist
Disc Manager
System
Clock Set
Channel Set
Language
Audio
Video
Parental Control
MOVE
SELECT
RETURN
EXIT

2 Press the ▲▼ buttons to select **Disc Manager**, then press the **ENTER** or ▶ button.

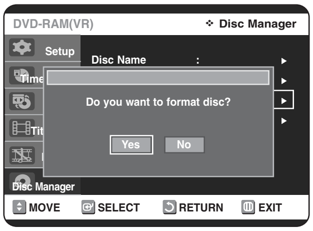

DVD-RAM(VR)
Disc Manager
Setup
Timer Rec.
Copy
Title List
Playlist
Disc Manager
Disc Name :
Disc Protection : Not Protected
Disc Format
Delete All Title Lists
MOVE
SELECT
RETURN
EXIT

3 Press the ▲▼ buttons to select **Disc Format**, then press the **ENTER** or ▶ button.


DVD-RAM(VR)
Disc Manager
Setup
Timer Rec.
Copy
Title List
Playlist
Disc Manager
Disc Name :
Disc Protection : Not Protected
Disc Format
Delete All Title Lists
MOVE
SELECT
RETURN
EXIT

DVD-RAM

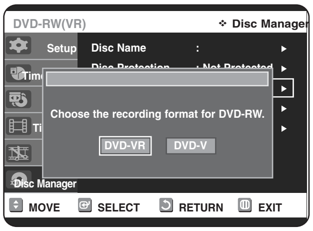
- You will be prompted with the confirmation message 'Do you want to format disc?'.


DVD-RAM(VR)
Disc Manager
Setup
Disc Name :
Do you want to format disc?
Yes
No
Disc Manager
MOVE
SELECT
RETURN
EXIT

- You will be prompted with the confirmation message 'All data will be deleted. Do you want to continue?'.

DVD-RW

- You will be prompted with the confirmation message ‘Choose the recording format for DVD- RW.’


Choose the recording format for DVD-RW.
DVD-RW(VR)
Disc Manager
Setup
Disc Name :
Disc Protection : Not Protected
DVD-VR
DVD-V
Disc Manager
MOVE
SELECT
RETURN
EXIT

4 Press the ◄ ► buttons to select **Yes**, then press the **ENTER** button. The disc is formatted.

DVD-VR and DVD-V are defined according to their recording format.

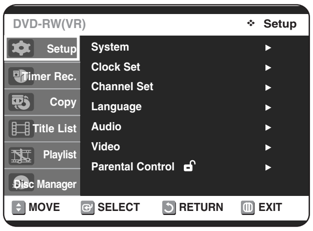
	DVD-VR	DVD-V
DISC	DVD-RAM DVD-RW	DVD-RW DVD-R

Finalizing a disc

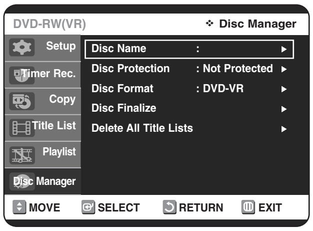
After you record titles onto a DVD-RW/DVD-R disc with your DVD Recorder & VCR, it needs to be finalized before it can be played back on external devices.

DVD-RW DVD-R

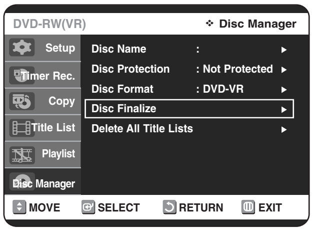
1 With the unit in Stop mode, press the **MENU** button.

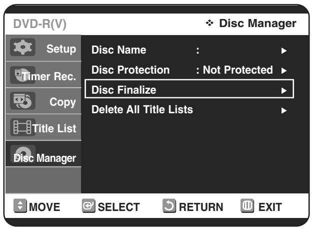

DVD-RW(VR)
Setup
Setup
Timer Rec.
Copy
Title List
Playlist
Disc Manager
System
Clock Set
Channel Set
Language
Audio
Video
Parental Control
MOVE
SELECT
RETURN
EXIT

2 Press the ▲▼ buttons to select **Disc Manager**, then press the **ENTER** or ► button.

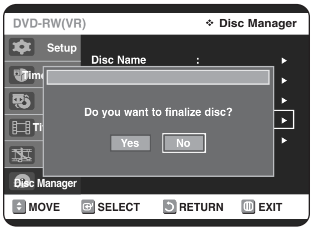

DVD-RW(VR)
Disc Manager
Setup
Timer Rec.
Copy
Title List
Playlist
Disc Manager
Disc Name :
Disc Protection : Not Protected
Disc Format : DVD-VR
Disc Finalize
Delete All Title Lists
MOVE
SELECT
RETURN
EXIT

3 Press the ▲▼ button to select **Disc Finalize**, then press the **ENTER** or ►

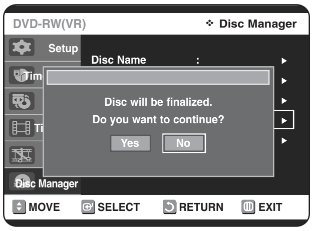

DVD-RW(VR)
Disc Manager
Setup
Timer Rec.
Copy
Title List
Playlist
Disc Manager
Disc Name :
Disc Protection : Not Protected
Disc Format : DVD-VR
Disc Finalize
Delete All Title Lists
MOVE
SELECT
RETURN
EXIT


DVD-R(V)
Disc Manager
Setup
Timer Rec.
Copy
Title List
Disc Manager
Disc Name :
Disc Protection : Not Protected
Disc Finalize
Delete All Title Lists
MOVE
SELECT
RETURN
EXIT

You will be prompted with the message 'Do you want to finalize disc?'.


Do you want to finalize disc?
DVD-RW(VR)
Disc Manager
Setup
Disc Name :
Yes
No
Disc Manager
MOVE
SELECT
RETURN
EXIT

If you select Yes, you will be prompted again with the message ' Disc will be finalized. Do you want to continue?'


Disc will be finalized.
Do you want to continue?
DVD-RW(VR)
Disc Manager
Setup
Disc Name :
Yes
No
Disc Manager
MOVE
SELECT
RETURN
EXIT

MEMO

14. Circuit Operating Descriptions

14-1 Power

14-1-1 About S.M.P.S

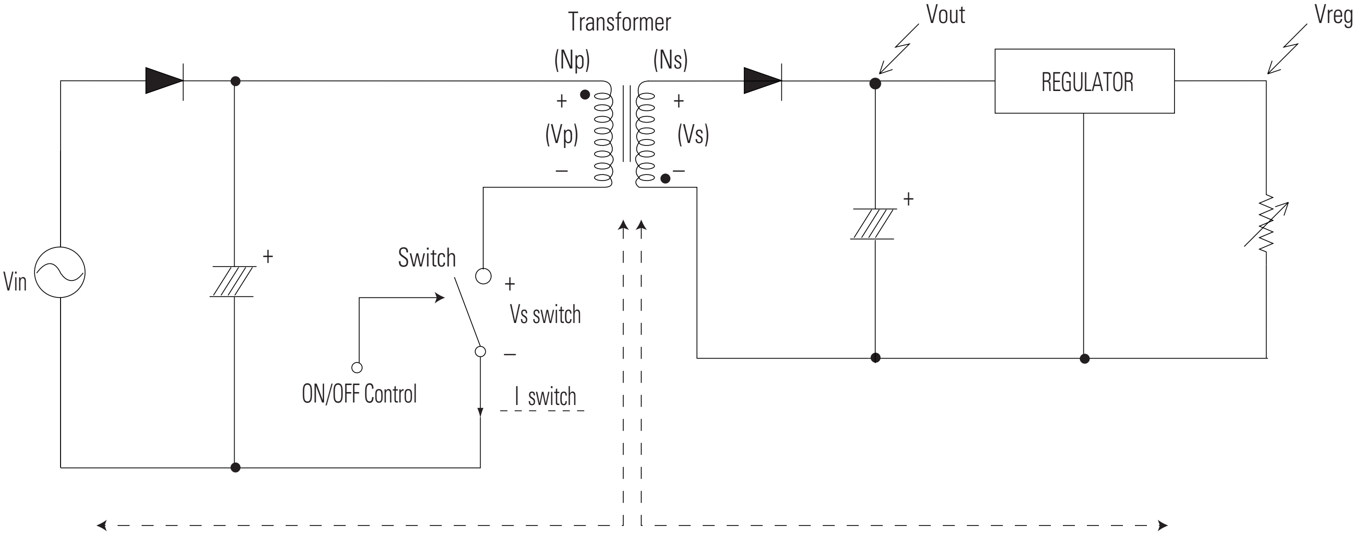

Transformer
(Np)
(Ns)
+
(Vp)
–
+
(Vs)
–
Vout
Vreg
REGULATOR
+
+
Vin
Switch
+
Vs switch
–
ON/OFF Control
I switch

Fig. 14-1

◆Terms

1) 1st : Common power input to 1st winding.
2) 2nd : Circuit followings output winding of transformer.
3) f (Frequency) : Switching frequency (T : Switching cycle)
4) Duty : (Ton/T) x 100

14-1-2 Circuit description Control

(a) AC Power Rectification/Smoothing Terminal
  1) BD01 : Convert AC power to DC (Wave rectification).
  2) CIS01 : Smooth the voltage converted to DC.
  3) L1S02, C1S04, C1S05 : Noise removal at power input/output.
  4) R1S04 : Rush current limit resistance at the momemt of power cord insertion.
    · Without R1S04, the bridge diode might be damaged as the rush current increases.

(b) SNUBBER Circuit : R1S02, R1S03, C1S08, C1S07, D1S05

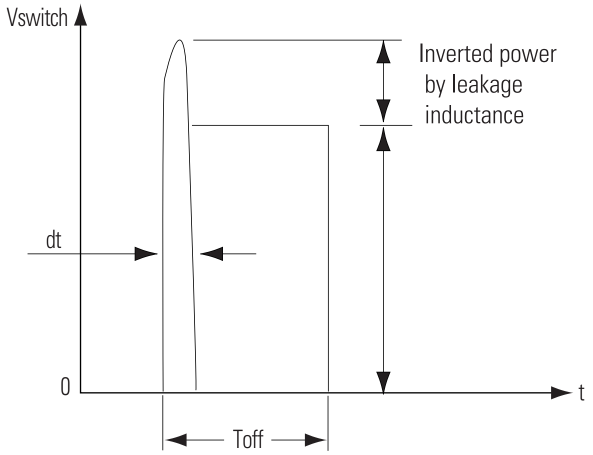


Fig. 14-2

1) Prevent residual high voltage at the terminals of switch during switch off/Suppress noise.
High inverted power occurs at switch off, because of the 1st winding of transformer :
(V=-L1 xdi/dt. L1 : Leakage Induction)
A very high residual voltage exist on both terminals of Q1S01 because dt is a very short.

2) SNUBBER circuit protects Q1S01 from damage through leakage voltage suppression by RC,
(Charges the leakage voltage to D1S05 and C1S08 and discharges to R1S02, R1S03).
3) C1S38 : For noise removal

(c) IC1S01 Vcc circuit

1) R1S05, R1S07, R1S08 : IC1S01 driving resistance (IC1S011 works through driving resistance at power cord in)
2) IS1S01 Vcc : R1S06, D1S07, C1S09
① Use the output of transformer as Vcc,because the current starts to flow into transformer while IC1S01 is active
② Rectify to D1S07 and smooth to C1S09.
③ Use the output of transformer as IC1S01 Vcc : The loads are different before and after IC1S01 driving. (Vcc of IC1S01 decreases below OFF voltage , using only the resistance dut to lode increase after IC1S01 driving.)

(d) Feedback Control Circuit

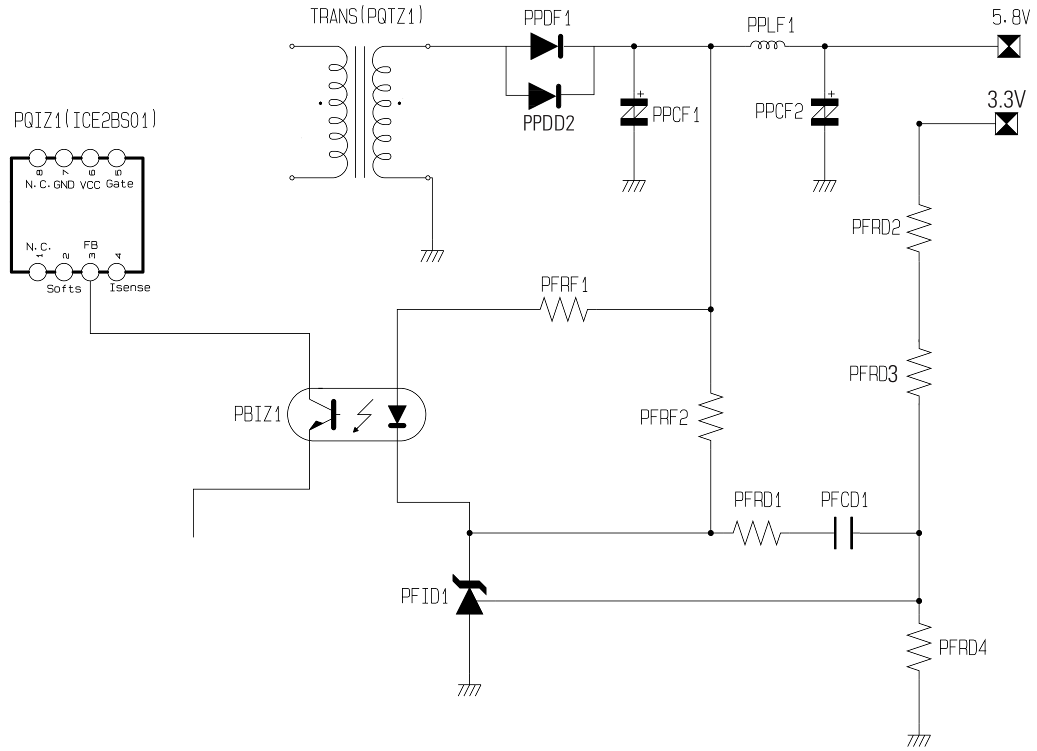

TRANS(PQTZ1)
PPDF1
PPDD2
PPCF1
PPLF1
PPCF2
5.8V
3.3V
PQIZ1(ICE2BS01)
8 7 6 5
N.C. GND VCC Gate
N.C. FB
1 2 3 4
Softs Isense
PFRF1
PFRD2
PFRD3
PBIZ1
PFRF2
PFRD1
PFCD1
PFID1
PFRD4

Fig. 14-3

1) F/B terminal of IC1S01 determines output duty cyle.
2) C-E (Collector-Emitter) of IC1S01 and F/B potential of IC1S01 are same.

14-1-3 Internal Block Diagram (Internal Block Diagram of S.M.P.S. Circuit)

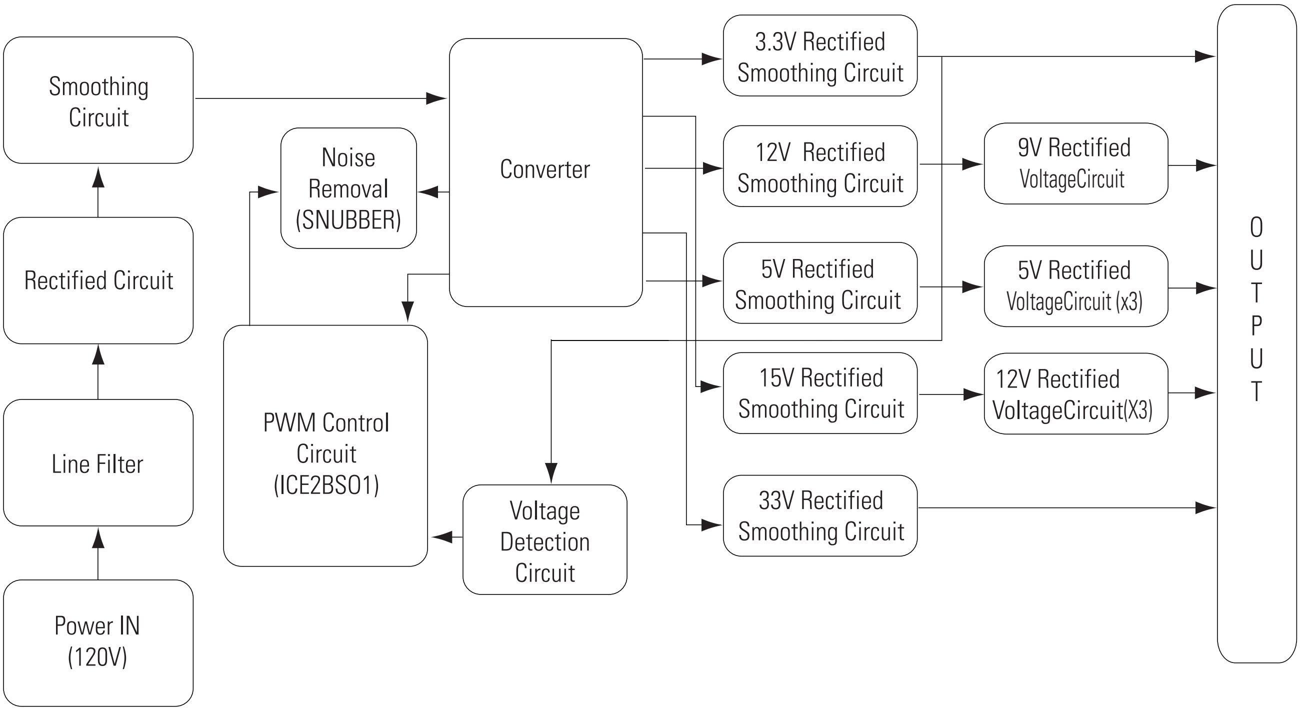

Smoothing Circuit
Rectified Circuit
Line Filter
Power IN (120V)
Noise Removal (SNUBBER)
Converter
PWM Control Circuit (ICE2BSO1)
Voltage Detection Circuit
3.3V Rectified Smoothing Circuit
12V Rectified Smoothing Circuit
5V Rectified Smoothing Circuit
15V Rectified Smoothing Circuit
33V Rectified Smoothing Circuit
9V Rectified VoltageCircuit
5V Rectified VoltageCircuit (x3)
12V Rectified VoltageCircuit(X3)
OUTPUT

Fig. 14-4

14-2 AV Codec

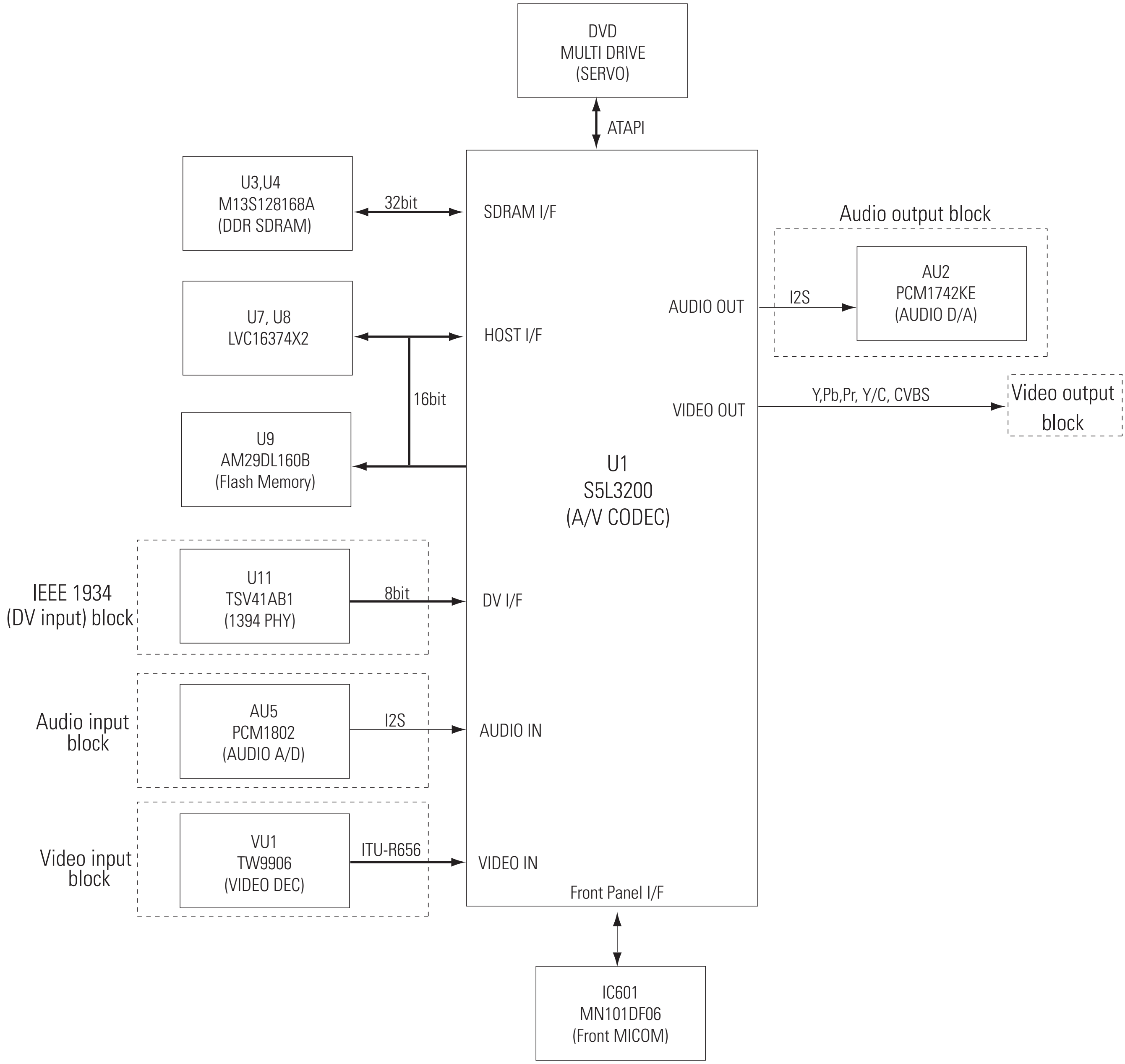

DVD
MULTI DRIVE
(SERVO)
ATAPI
U3,U4
M13S128168A
(DDR SDRAM)
32bit
SDRAM I/F
Audio output block
AU2
PCM1742KE
(AUDIO D/A)
I2S
AUDIO OUT
U7, U8
LVC16374X2
HOST I/F
16bit
VIDEO OUT
Y,Pb,Pr, Y/C, CVBS
Video output block
U9
AM29DL160B
(Flash Memory)
U1
S5L3200
(A/V CODEC)
IEEE 1934
(DV input) block
U11
TSV41AB1
(1394 PHY)
8bit
DV I/F
Audio input block
AU5
PCM1802
(AUDIO A/D)
I2S
AUDIO IN
Video input block
VU1
TW9906
(VIDEO DEC)
ITU-R656
VIDEO IN
Front Panel I/F
IC601
MN101DF06
(Front MICOM)

Fig. 14-5

· Main system control
· A/V Encoding/Decoding
· Transcoding/rating
· IEEE 1394 link layer function

· ATAPI interface with DVD-Multi Drive
· Analog Progressive/interlaced video output

13-2-1 GENERAL DESCRIPTION

Samsung S5L3200 MPEG AV Codec is designed to provide a cost-effective, low power size and high performance DVD recorder solution for DVD-VR, DVD-video, DVD-audio & many of CD applications. To reduce total system cost, The S5L3200 also provides the following features: a front-end controller, a back-end decoder, a control CPU with separate 4KB instruction and 4KB data cache, an improved audio DSP, a programmable video encoder with a dual output capability of interlaced and progressive scan, DDR memory controller, 4-channel timers with PWM, I/O ports, 5-channel 10-bit DACs, 2-channel UARTs with handshake, IIC bus interface, IIS bus interface, SPI, dual ATAPI, IEEE1394, USB 1.1 Host I/F and PLL for clock generation.

13-2-2 A/V Processor (V1) Functional Description

1) RISC processor architecture
- ARM940T core processor
- Fully 16/32-bit RISC architecture
- Harvard cache architecture with separate 4KB instruction and 4KB data cache
- Protection unit to partition memory and set individual protection attributes for each partition
- Up to 200 MHz operating frequency.

2) Memory controller
- Address space: 256 M-byte for each bank (total 1 Gbyte space)
- Supports programmable 8/16-bit data bus width for ROM/SRAM interface
- Supports 16-bit data bus width for DDR-SDRAM interface
- 3 memory banks; 2 memory banks for ROM, SRAM etc, 1 memory bank for SDRAM
- Fully programmable access cycles for all memory banks
- Supports external wait signal to expand the bus cycle.

3) Cache memory
- 64 way set-associative cache with I-cache (4KB) and Dcache (4KB)
- 8-words per line with one valid bit and two dirty bits per line
- Pseudo random or round robin replacement algorithm
- Write through or write back cache operation to update the main memory
- Write buffer can hold 8 words of data and four addresses.

Clock & power manager
- Low power consumption
- On-chip PLLs
- Clock can be fed selectively to each function block by software
- Power mode: normal, slow and idle mode (normal mode: normal operating mode, slow mode: low frequencclock without PLL, idle mode: stop CPU clock only)
- Wake up by interrupt from idle mode.

4) Interrupt controller

- 32 interrupt sources (watch dog timer, 4 timers, UARTs, 8 external interrupts, IIC, IIS, SPI, IR, etc.)
- Edge detect mode on external interrupt source
- Programmable polarity of rising and falling
- Supports FIQ (fast interrupt request) for very urgent interrupt request.

5) Video pre-processor

- Noise reduction by motion-compensated temporal filtering
- Bitmap generation for motion estimation of MPEG encoder
- Scene change detection.

6) MPEG video encoder

- Encodes MPEG1 & MPEG2 video stream (MP@ML)
- Efficient motion estimation by hierarchical motion vector search and binary image matching.

7) MPEG video decoder

- Decodes MPEG1 & MPEG2 video stream (MP@ML)
- Error detection and autonomous error concealment.

8) Audio DSP

- Decodes Dolby AC-3, MPEG1, MPEG2, DTS, MLP, HDCD, AAC and WMA
- Supports down mix
- MAC2424 for audio signal processing
  - 24-bit high performance fixed-point DSP coprocessor, 24x24 MAC operation in 1 cycle.
  - 2 multiplier accumulator registers, 4 general accumulator registers, and 8 pointer registers.

14-3 SERVO (DVP Multi Drive)

1) Pick-Up

Data in the disc is processed from the optical pick-up unit (OPU). OPU includes the Elantec chip (EL6912c) which is a highly integrated laser diode driver designed to support multi-standard writable optical drives. This chip also has an IV amplifier with concurrent read and write sampling. The architecture allows reprogramming of the timers to support different media DVD or CD standards, and different speed.

2) A-Chip

A chip is RF processor. This module performs RF signal processing which includes RFIP, RFIN, AGC, RF equal izer. This processor is able to detect tracking error, focus error and various signals such as CE, PE, SBAD, DEFECT, BCA, MIRROR, Wobble, TZC, RC, and RECD.

3) C-Chip

C-Chip is composed of DP1, PRML and WS.

First, the Data processor1 (DP1) performs EFM/EFM+ Demodulation and data is stored in the buffer memory in data processor2 (DP2). DVD data in this buffer is transferred to CSS/ATAPI through error-correction code

(ECC), descramble process and error detection code (EDC).

Second, WS performs the following processes.

① Delay compensation using Shift register
② Sample/Hold pulse generation
③ I/V Gain Control
④ Providing clock for RF chip
⑤ OPC Control signal generation

Lastly, PRML completes the adaptive EQ/VD and Digital PLL.

4) D-Chip

D-Chip consists of Servo DSP, DP2 and 1Mbit memory. Servo DSP is dealing with controlling the servo-mecha nism in DVD recorder. Servo-DSP has the following features.

① Bulit-in 10Bit ADC(8ch), DAC(3ch) and PWM(7ch)
② Step Motor Control Logic: Macro/Micro Step
③ Track Counter: long distance velocity control direct seek
④ Shock/Defect detection
⑤ Header (DVD-RAM)/Land Pre-Pit (DVD-R/RW) Detection
⑥ Several Servo Monitor Signal Detection
⑦ RF IC Interface
⑧ Micom Interface
⑨ Digital Servo Control of focus, tracking, sled and seek
⑩ Disc Auto-Detection
⑪ Automatic Adjustment of the offset, balance and gain of Focus and Tracking Signal
⑫ Direct Seek with Velocity Control
⑬ Step Motor Control: Macro Seek
⑭ De-Track and Lens Shift Detection and Compensation
⑮ Center Error Control
⑯ DVD Layer Jump
⑰ Tilt Detect and Compensation

DP2 performs High Speed ECC and CD DA Decoder.

5) ATAPI Controller

ATAPI (ATA Packet Interface) the standard interface protocol used to connect the CD/DVD Drive to IDE inter face. Data from the front-end is processed to back-end through this ATAPI protocol. Sanyo chip (LC98600CT-XB0) is utilized for ATAPI interface. LC98600CT-XB0 has the following features.

① ECC and EDC correction/addition for CD-ROM data
② Subcode decoding/encoding
③ Spindle servo control
④ CLV/CAV servo control using ATIP data
⑤ ATIP decoding and CRC check functions
⑥ Providing random EFM output for PCA use
⑦ High-accuracy write strategy signal output enabled (CD-R 52x)
⑧ Buffer RAM can be accessed by the microcontroller through the LC98600CT-XB0
⑨ Built-in ATA-PI(IDE) interface (supports Ultra DMA modes 0,1, and 2)
⑩ 52x decoding speed/52x encoding speed supported with 33.8688Mhz
⑪ Maximum transfer speed PIO mode: 16.6 MB/s (with IORDY), Ultra-DMA: 66MB/s (with DMARQ)
⑫ User can freely set the CD main channel, C2 flag, and subcode areas in buffer RAM
⑬ Built-in batch transfer function for transferring (CD main channel, C2 flag, etc., in a single operation)
⑭ Built-in multi-transfer function (allows multiple blocks to be sent to the host automatically in a single operation)

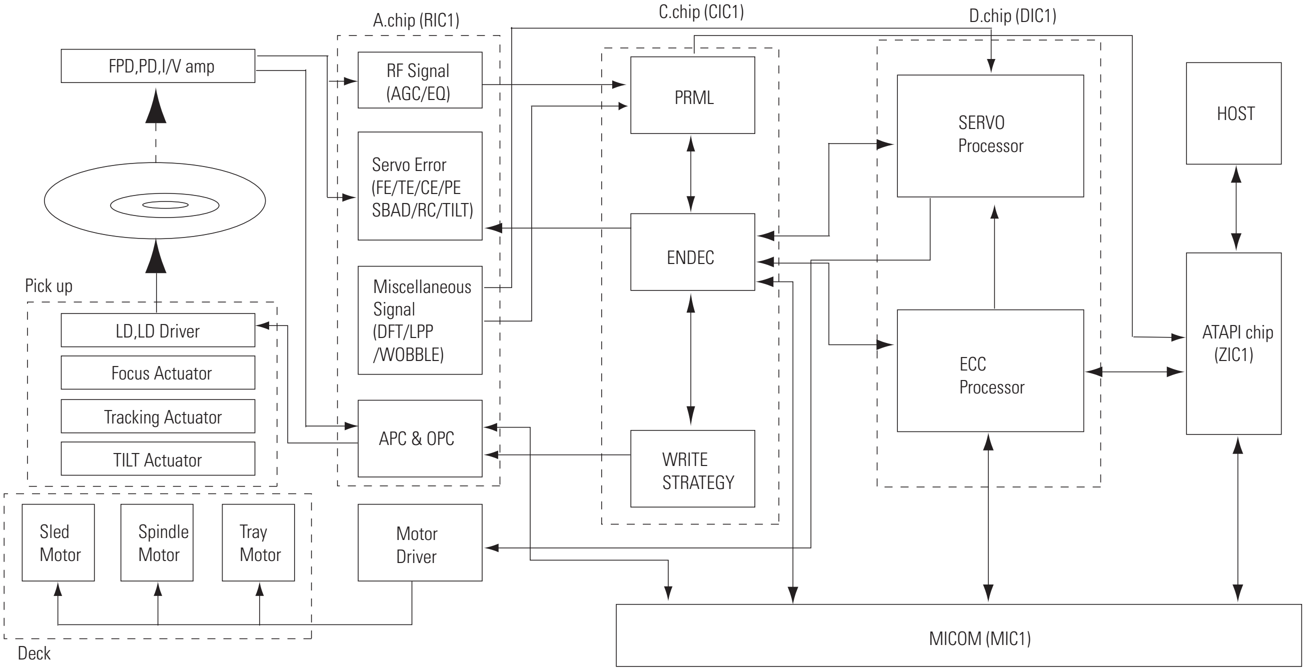

A.chip (RIC1)
C.chip (CIC1)
D.chip (DIC1)
FPD,PD,I/V amp
RF Signal (AGC/EQ)
Servo Error (FE/TE/CE/PE SBAD/RC/TILT)
Miscellaneous Signal (DFT/LPP /WOBBLE)
APC & OPC
PRML
ENDEC
WRITE STRATEGY
SERVO Processor
ECC Processor
HOST
ATAPI chip (ZIC1)
Pick up
LD,LD Driver
Focus Actuator
Tracking Actuator
TILT Actuator
Sled Motor
Spindle Motor
Tray Motor
Deck
Motor Driver
MICOM (MIC1)

Fig. 14-6

14-4 Video Input

14-4-1 Video Input Outline

DVD-VR320A is the two Line Video input. Line 1 Video input is CVBS1 & S-Video1 at the Rear Panel.
Line 2 Video input is CVBS2 at the Front Panel.
The analog Video signal select Line 1 or Line 2 by the IC601 (Front Micom).
TIC1 (Video Decoder) diverges from the 27MHz crystal, then generates ITU-R656 (10bits) and 27MHz clock.
TIC1 (Video Decoder) does closed caption, copy guard detect processing and A/D conversion of analog Video signal converted into 11bit Digital Video signal (ITU-R656 Format) is outputted via DIC1 (MPEG2 Decoder & Encoder with video Encoder) of digital part.

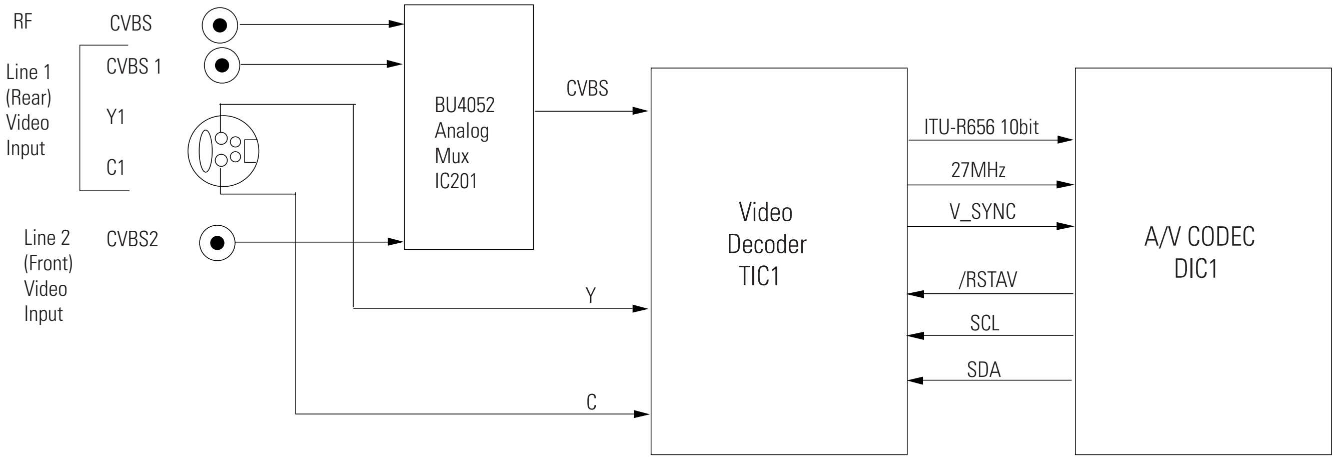

RF
CVBS
Line 1 (Rear) Video Input
CVBS 1
Y1
C1
Line 2 (Front) Video Input
CVBS2
BU4052 Analog Mux IC201
CVBS
Y
C
Video Decoder TIC1
ITU-R656 10bit
27MHz
V_SYNC
/RSTAV
SCL
SDA
A/V CODEC DIC1

Fig. 14-7

14-4-2 Analog Mux (BU4052)

IC201 is Analog Mux.
As Pin 9, 10 of the IC201 are controlled by the Front Micom, IC201 select RF OF CVBS(Pin12) Line1 of CVBS[Pin14] and Line2 of CVBS[Pin 15].
The analog Video Signal of IC201 output is selected by the ic601 via TIC1(Video Decoder : TW9906) of analog Video input parts.

14-4-3 NTSC/PAL Video Decoder (TW9906 : Video Decoder)

The TIC1 (Video Decoder : TW9906) device is a high quality, single-chip digital video decoder that digitizes and decodes all popular baseband analog video formats into digital component video. The TIC1 (Video Decoder : TW9906) supports the analog-to-digital (A/D) conversion of component RGB and YPbPr signals, as well as the A/D conversion and decoding of NTSC, PAL and SECAM composite and S-video into component YCbCr.
This TIC1 (Video Decoder : TW9906) includes four 10-bit 30-MSPS A/D converters. and A/D conversion of 10bit analog Video signal converted into Digital Video signal (ITU-R656 Format) is outputted via
DIC1 (MPEG2 Decoder & Encoder with video Encoder) of digital part.
The following output formats supply 10-bit 4:2:2 YCbCr to the DIC1 (MPEG2 Decoder & Encoder with video Encoder) of digital part.
On CVBS and S-video inputs, the user can control video characteristics such as contrast, Brightness, saturation, and hue via an I2C DIC1 port [PIN V17, V18] interface.
The TW9906 decoder includes methods for advanced vertical blanking interval (VBI) data retrieval. The VBI data processor (VDP) slices, parses, and performs error checking on teletext, closed caption (CC), Copy Guard Detect Processing and other VBI data.

14-5 Video Output

14-5-1 Outline

DIC1 (MPEG2 Decoder & Encoder with video Encoder) diverges from the 13.5MHz crystal, then generates VSYNC and HSYNC.
DIC1 (MPEG2 Decoder & Encoder with video Encoder) does RGB encoding, copy guard processing and D/A conversion of 10bit Video signal converted into analog signal is outputted via amplifer of analog part.

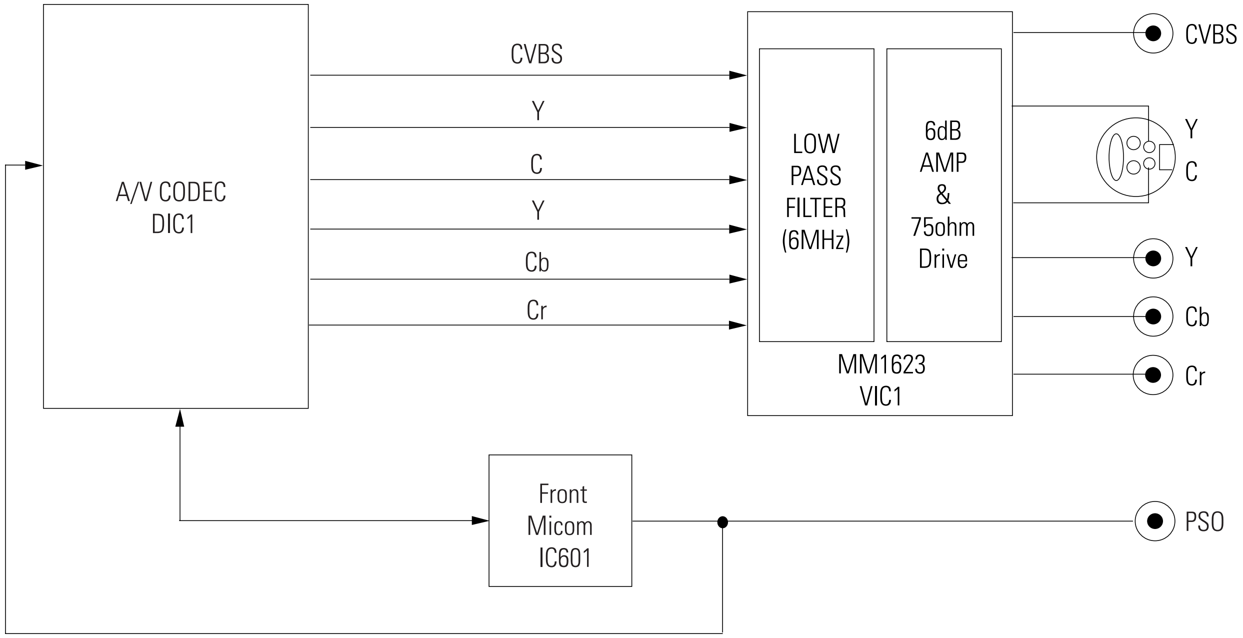

A/V CODEC
DIC1
CVBS
Y
C
Y
Cb
Cr
LOW
PASS
FILTER
(6MHz)
6dB
AMP
&
75ohm
Drive
MM1623
VIC1
CVBS
Y
C
Y
Cb
Cr
Front
Micom
IC601
PSO

Fig. 14-8

14-5-2 NTSC/PAL Digital

DIC1 inputted from pin E1 with 13.5MHz generates HSYNC and VSYNC which are based on video signal. DIC1 is synchronous signals with decoded video signal.
The above signals, which are CVBS (Composite Video Burst Synchronized), Y(S_Video), C(S_Video), Y(Component)/G(Green), Cr(component)/R(Red), Cb(component)/B(Blue), are selectively outputted 480i (interlaced Video Output), 480P(progressive Video Output) by the Pront button DiC1 adopts 10bit D/A converter.
DIC1 perform video en-coding as well as copy protection.

14-5-3 Amplifier (MM1623)

VIC1 is 6dB amplifier.
Based on CVBS signal, the final output level must be 2Vpp without 75ohm terminal resistance.
Because the level of video encoder output is only 1Vpp, the level is adjusted with the special amplifier.
When mute of pin 3 is high active, if the pin is floating and connect to power, the output signal is never out putted.
CVBS, Y, C, Y(R), Cb(B), Cr(R) outputted from video encoder are inputted to VIC1 [Pin4, 6, 2, 10, 12, 14] respec tively.
The signal to which gain is adjusted by amplifier is outputted from jack via 75ohm Resistance (VR30,31,32,33,34,60).

14-6 Audio

14-6-1 Input Block

DVD-VR320A has two stereo line input terminals. and internal TV-audio from RF Tuner Block. These three Analog audio signal source are converted to digital data by Input Block.
Input Block has a Multiplexer (IC203), Input Filter (AIC81, AIC82), and A/D converter (AIC9).
IC203 change it's output by selection control signal from IC601 (Front Micom).
The output signal of IC203 are filtered by OP-Amp (AIC81, AIC82).
AIC81 (L-ch) have two op-amp in each.

14-6-2 Output Block

DVD-VR320A has two stereo analog line out terminal, and two digital output terminal.
Decoded signal by DIC1 is inputted to AIC1 (D/A Converter), then filtered and amplified by AIC4 (OP-Amp).
And the digital audio signal (IEC-958) is drived by AIC3 inverter and ouputted in Optical/Coaxial (S/PDIF) terminal.

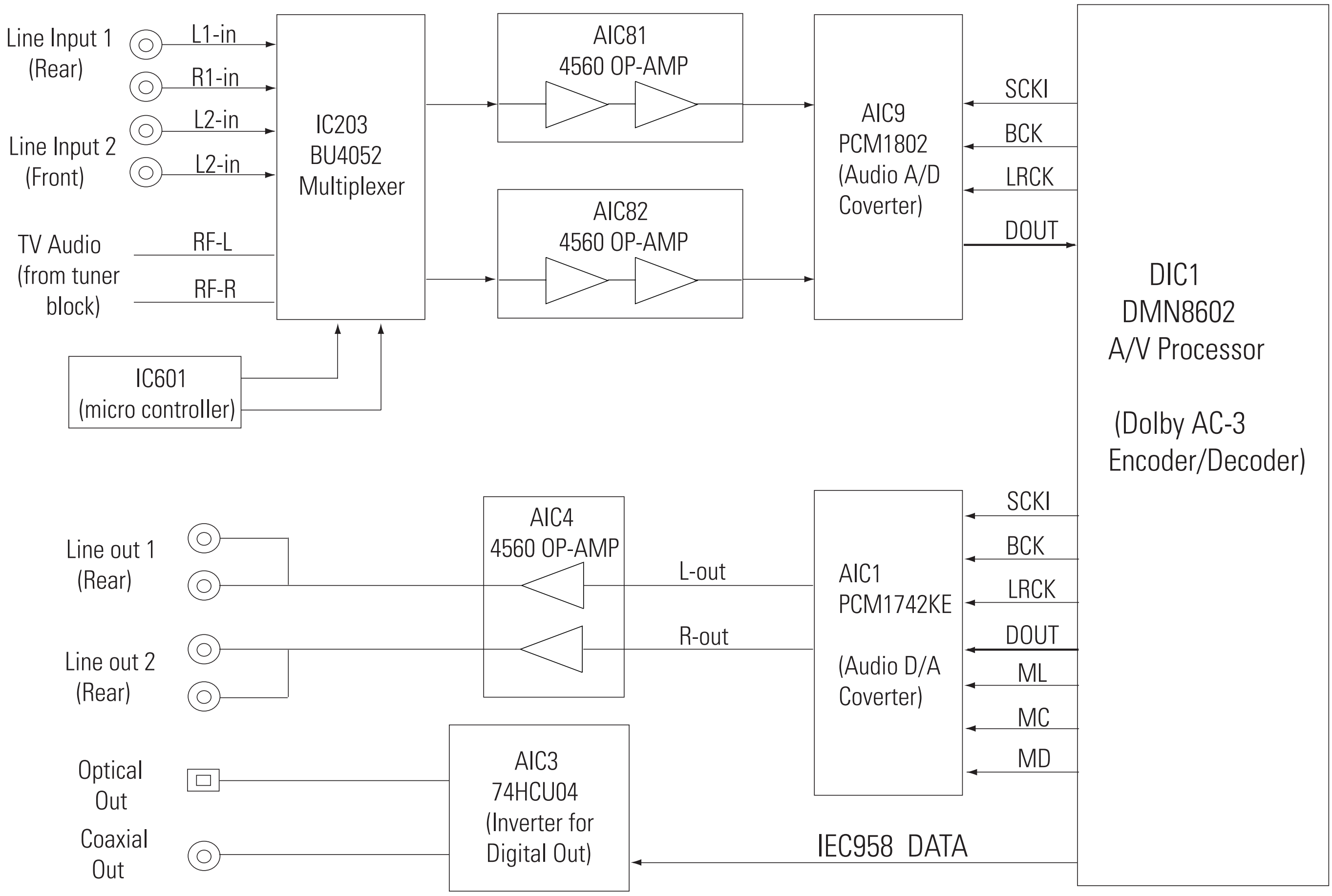

Line Input 1
(Rear)
L1-in
R1-in
L2-in
Line Input 2
(Front)
L2-in
TV Audio
(from tuner
block)
RF-L
RF-R
IC203
BU4052
Multiplexer
IC601
(micro controller)
AIC81
4560 OP-AMP
AIC82
4560 OP-AMP
AIC9
PCM1802
(Audio A/D
Coverter)
SCKI
BCK
LRCK
DOUT
DIC1
DMN8602
A/V Processor
(Dolby AC-3
Encoder/Decoder)
Line out 1
(Rear)
Line out 2
(Rear)
AIC4
4560 OP-AMP
L-out
R-out
AIC1
PCM1742KE
(Audio D/A
Coverter)
SCKI
BCK
LRCK
DOUT
ML
MC
MD
Optical
Out
Coaxial
Out
AIC3
74HCU04
(Inverter for
Digital Out)
IEC958 DATA

Fig. 14-9

14-7 Tuner

1) Low Pass Filter & High Pass Filter
This consists of IF trap circuit and UHF & VHF separation circuit. If the input signal is IF (45.75MHz), this filter
prevents interference.

2) Single tune
This consists of a filter circuit, RF AMF, impedance conversion circuit, image trap and a single tuning circuit. It prevents noise and other interference signals. It is very important part which improves NF (noise figure) and prevents the various of spurious signals.

3) RF AMF
RF AMF is made of FET (Field Effects Transistor). It is controlled by AGC coming from IF DEMOD block.

4) Double tune
It consists of a double tuning circuit to improve characteristic of rejection that results in a better band characteristic.

5) Mixer IC (Mixer, OSC, PLL)
It consists a VHF and UHF OSC and Mixer circuit. We applied mixer to make better characteristic of rejection, it shows especially various beat characteristic.

6) PLL IC
The PLL IC plays a role selection of Tuner channel. It was built-in three wire PLL IC, charge pump and band driver.
The minimum of step frequency is 31.25KH z.

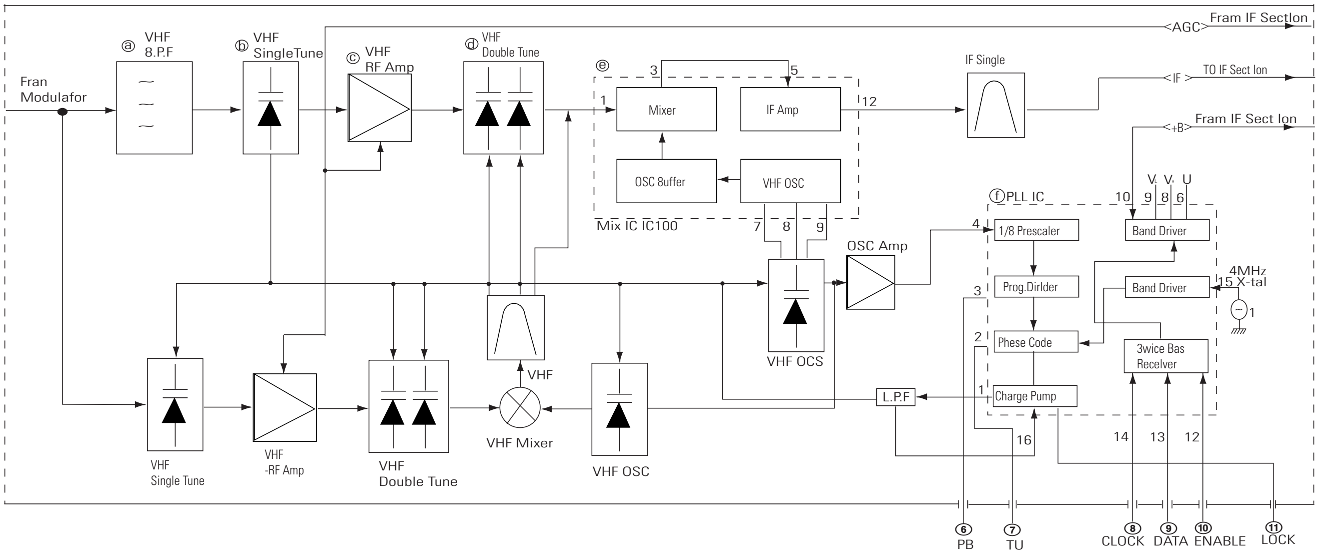

Fran Modulafor
ⓐ VHF 8.P.F
ⓑ VHF SingleTune
ⓒ VHF RF Amp
ⓓ VHF Double Tune
ⓔ
3
5
1
Mixer
IF Amp
12
OSC 8uffer
VHF OSC
Mix IC IC100
7
8
9
IF Single
<AGC> Fram IF Sectlon
<IF > TO IF Sect Ion
<+B> Fram IF Sect Ion
ⓕ PLL IC
10 9 8 6
V V U
4
1/8 Prescaler
Band Driver
OSC Amp
3
Prog.Dirlder
Band Driver
4MHz
15 X-tal
1
2
Phese Code
3wice Bas Recelver
1
Charge Pump
L.P.F
VHF OCS
VHF
VHF Mixer
VHF Single Tune
VHF -RF Amp
VHF Double Tune
VHF OSC
16
14
13
12
⑥ PB
⑦ TU
⑧ CLOCK
⑨ DATA
⑩ ENABLE
⑪ LOCK

Fig.14-10

14-8 IF

1) SAW FILTER
It passes only needed band of the signal that is converted to IF frequency and decrease the others band to minimize the effect of adjacent channel.

2) RF AGC Control
It used adjusting to determine RF AGC working point in tuner.

3) VCO Tank
When VCO tank detects PLL, it makes the signal which sets a standard.

4) AFT (Auto Frequency Tuning)
AFT automatically controls the oscillator frequency in the tuner, so that it retains a constant level.
It is a quadrature detection type. The carrier, which is detected from video det is directly input to AFT.
The 90 degree delayed phase signal is input at the same time to AFT and, the results come out.

5) IF AMP
IF signal , which is selected in Saw filter, is amplified in IF amp frequency enough to be detected. The IF amp has parallel inputs & outputs structure.

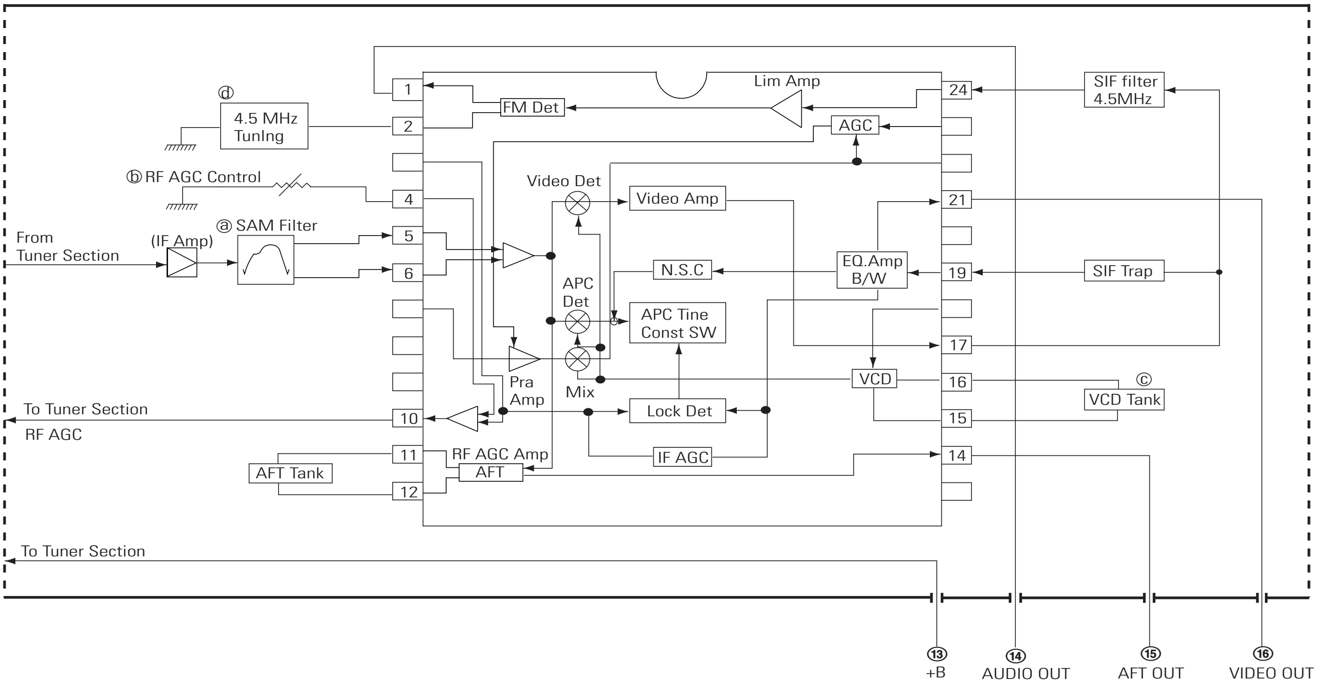

ⓓ
4.5 MHz Tuning
ⓑ RF AGC Control
ⓐ SAM Filter
From Tuner Section
(IF Amp)
To Tuner Section
RF AGC
AFT Tank
To Tuner Section
1
2
4
5
6
10
11
12
FM Det
Lim Amp
AGC
Video Det
Video Amp
N.S.C
APC Det
APC Tine Const SW
Pra Amp
Mix
Lock Det
IF AGC
RF AGC Amp
AFT
EQ.Amp B/W
VCD
24
21
19
17
16
15
14
SIF filter 4.5MHz
SIF Trap
ⓒ
VCD Tank
⑬ +B
⑭ AUDIO OUT
⑮ AFT OUT
⑯ VIDEO OUT

Fig. 14-11

14-9 VCR System Control

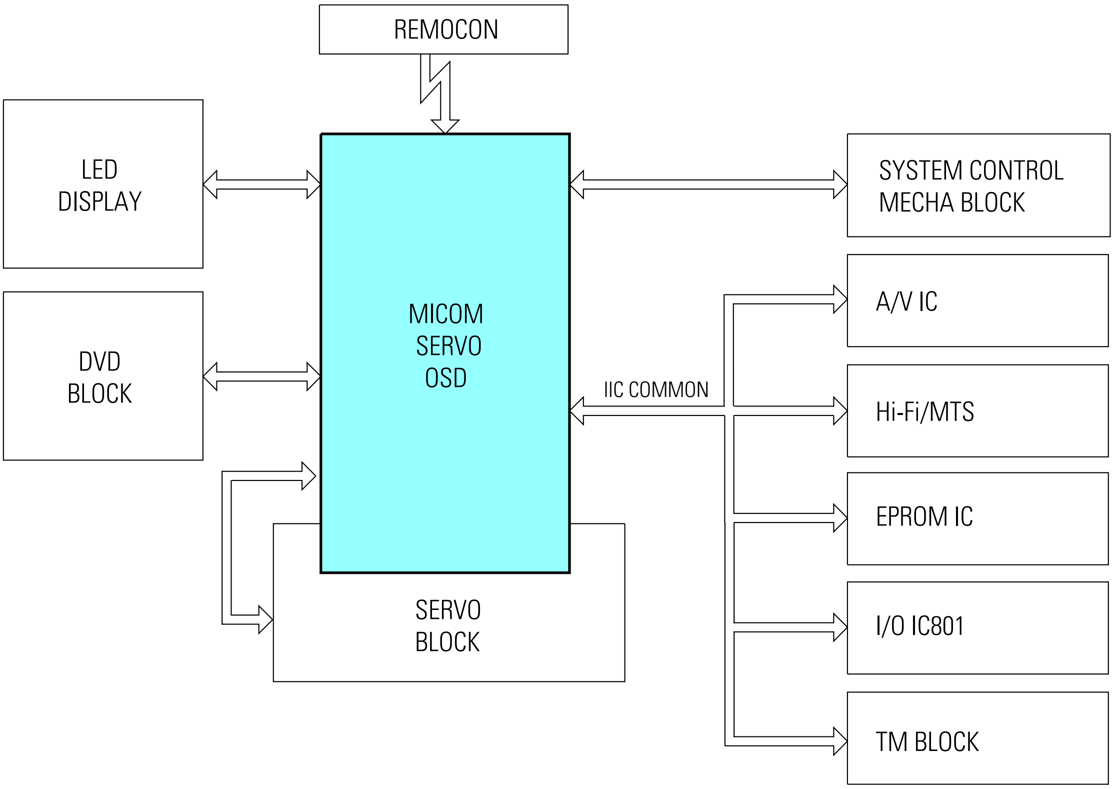

REMOCON
LED DISPLAY
DVD BLOCK
MICOM SERVO OSD
SERVO BLOCK
SYSTEM CONTROL MECHA BLOCK
IIC COMMON
A/V IC
Hi-Fi/MTS
EPROM IC
I/O IC801
TM BLOCK

Fig. 14-12 Micom Block Diagram

(1) Outline

The system control circuit inputs the commands given by the operator to set the mechanism and circuit to the commanded mode. The circuit also inputs the detected output from the tape and mechanism protection sensor and protects the VCR and tape against abnormal operation.
Fig. 14-11 is a simplified system control block diagram.
The system control is performed by 4 control sections. (System and timer control, Servo control, F/S Tuner, On Screen Display).

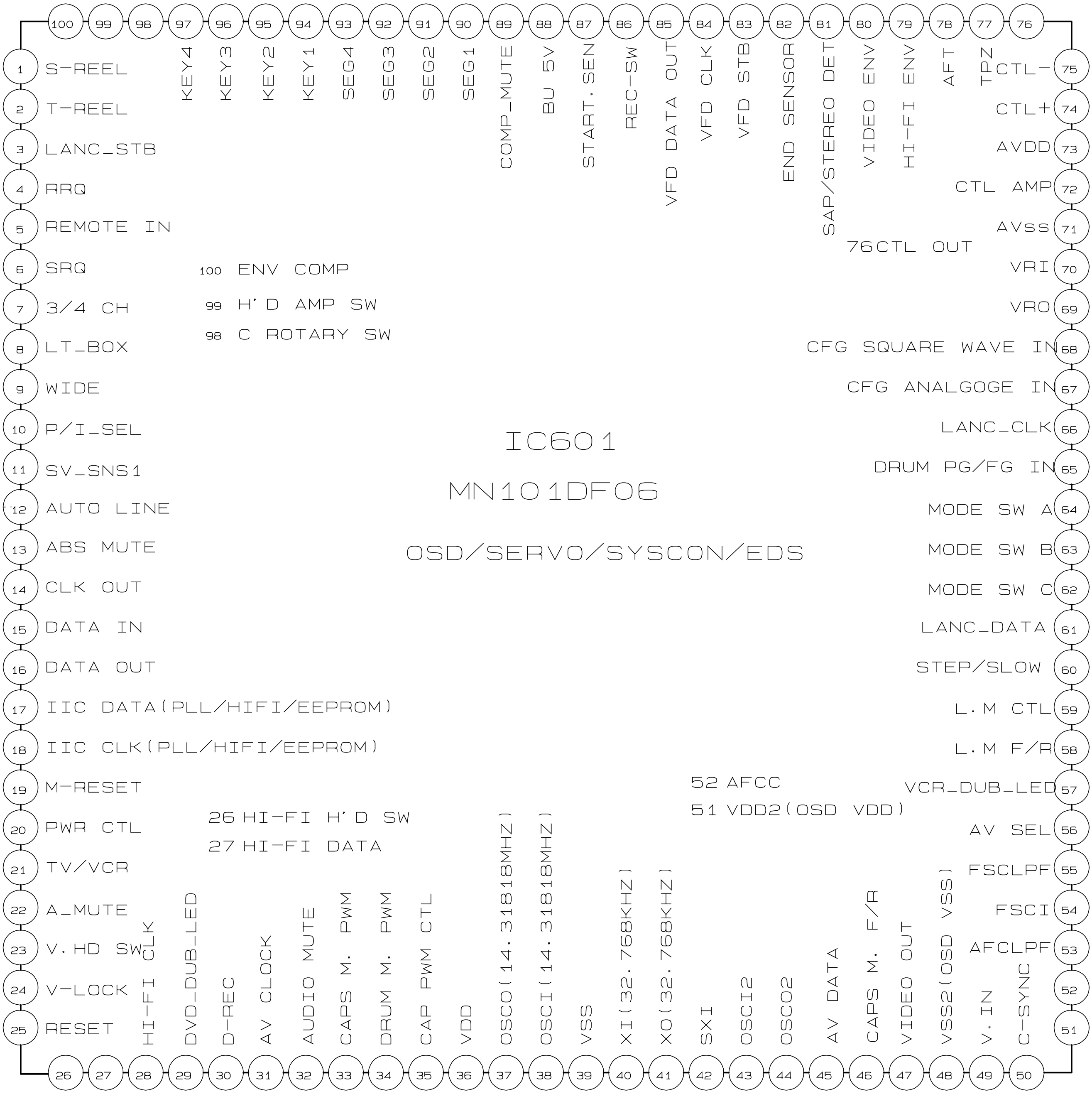

IC601
MN101DF06
OSD/SERVO/SYSCON/EDS
1 S-REEL
2 T-REEL
3 LANC_STB
4 RRQ
5 REMOTE IN
6 SRQ
7 3/4 CH
8 LT_BOX
9 WIDE
10 P/I_SEL
11 SV_SNS1
12 AUTO LINE
13 ABS MUTE
14 CLK OUT
15 DATA IN
16 DATA OUT
17 IIC DATA(PLL/HIFI/EEPROM)
18 IIC CLK(PLL/HIFI/EEPROM)
19 M-RESET
20 PWR CTL
21 TV/VCR
22 A_MUTE
23 V.HD SW
24 V-LOCK
25 RESET
26 HI-FI H'D SW
27 HI-FI DATA
28 HI-FI CLK
29 DVD_DUB_LED
30 D-REC
31 AV CLOCK
32 AUDIO MUTE
33 CAPS M. PWM
34 DRUM M. PWM
35 CAP PWM CTL
36 VDD
37 OSCO(14.31818MHZ)
38 OSCI(14.31818MHZ)
39 VSS
40 XI(32.768KHZ)
41 XO(32.768KHZ)
42 SXI
43 OSCI2
44 OSCO2
45 AV DATA
46 CAPS M. F/R
47 VIDEO OUT
48 VSS2(OSD VSS)
49 V.IN
50 C-SYNC
51 VDD2(OSD VDD)
52 AFCC
53 AFCLPF
54 FSCI
55 FSCLPF
56 AV SEL
57 VCR_DUB_LED
58 L.M F/R
59 L.M CTL
60 STEP/SLOW
61 LANC_DATA
62 MODE SW C
63 MODE SW B
64 MODE SW A
65 DRUM PG/FG IN
66 LANC_CLK
67 CFG ANALGOGE IN
68 CFG SQUARE WAVE IN
69 VRO
70 VRI
71 AVss
72 CTL AMP
73 AVDD
74 CTL+
75 CTL-
76 CTL OUT
77 TPZ
78 AFT
79 HI-FI ENV
80 VIDEO ENV
81 SAP/STEREO DET
82 END SENSOR
83 VFD STB
84 VFD CLK
85 VFD DATA OUT
86 REC-SW
87 START.SEN
88 BU 5V
89 COMP_MUTE
90 SEG1
91 SEG2
92 SEG3
93 SEG4
94 KEY1
95 KEY2
96 KEY3
97 KEY4
98 C ROTARY SW
99 H'D AMP SW
100 ENV COMP

Fig. 14-13 IC601 Block Diagram

(2) Mechanism/Circuit Control

When the u-COM inputs operator's commands via the key input or remote input, the mechanism and circuits are set to the command mode. This function controls mechanism/servo section and audio/video processing section.

1) Cassette Loading Control

Controls loading and ejection of a cassette and determines the mechanism operation mode; tape loading/unloading, action/release of various breaks, tension, take up mechanism etc.

2) Tape Protection Sensor Monitoring

Detects abnormal operation in tape using the supply and take up end sensor, reel sensor and SW 30Hz pulse for drum rotation.

3) Capstan Motor Control

Determines the tape speed and direction, fast forwards and rewinds the tape etc.

4) Tape Counter Control

Counts the control pulses on the control track, picked up by the control head and shows it on the digital multidisplay.

5) Servo Control

Determines the operation mode of the servo circuit. Control the speed of drum and capstan motor, and then Control the phase of drum and capstan motor.

6) Record Safety Tap Detection

Detects the safety tab on the rear of a cassette to prevent a prerecorded program from being erased.

7) Loading/Unloading control

Controls a series of loading/unloading operation after the u-COM judges the operation mode and sets the mechanism to suitable mode. Fig. 14-13 show correlation between u-COM and peripheral components during the loading/unloading operation.
The mechanism state switch (PROG. SW) detects the mechanism position. When the driving gear is turned by the loading motor, the switch driving slider traces the groove, and this switch stops at the correct position corresponding to each mode. In other words, the u-COM judges the present mechanism state from the PROG SW after receiving the mode data, then it outputs the loading motor and capstan motor control signals.
This continues until the PROG SW reaches the correct state by the u-COM.

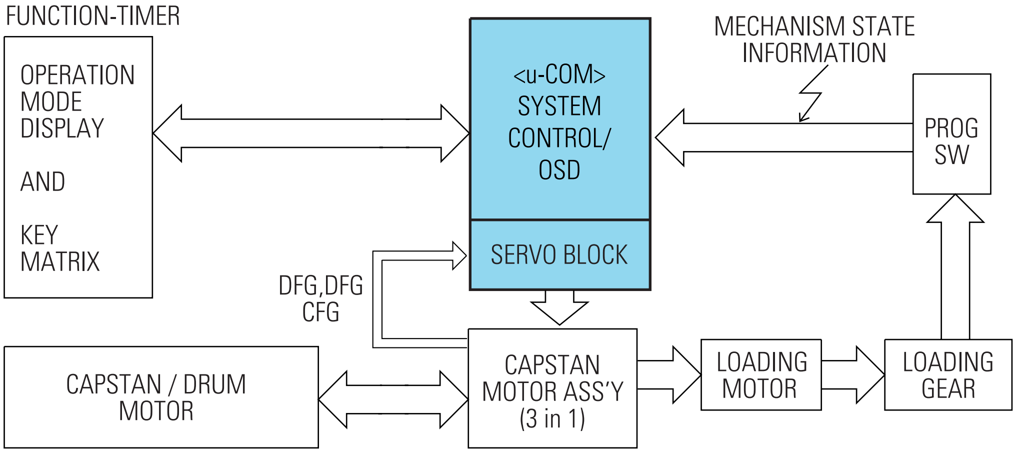

FUNCTION-TIMER
OPERATION MODE DISPLAY AND KEY MATRIX
<u-COM> SYSTEM CONTROL/ OSD
SERVO BLOCK
MECHANISM STATE INFORMATION
PROG SW
DFG,DFG CFG
CAPSTAN / DRUM MOTOR
CAPSTAN MOTOR ASS'Y (3 in 1)
LOADING MOTOR
LOADING GEAR

Fig. 14-14 The Relationship Between u-COM, Capstan, Cylinder and Loading Motor

(3) Program SW Input

The mechanism state for each mode is shown in table 1 below. The mechanism state is classified into position, and correlation between the switch position and mechanism state is shown in table 1, also.

Table 1 : Prog. SW State in Each Mode

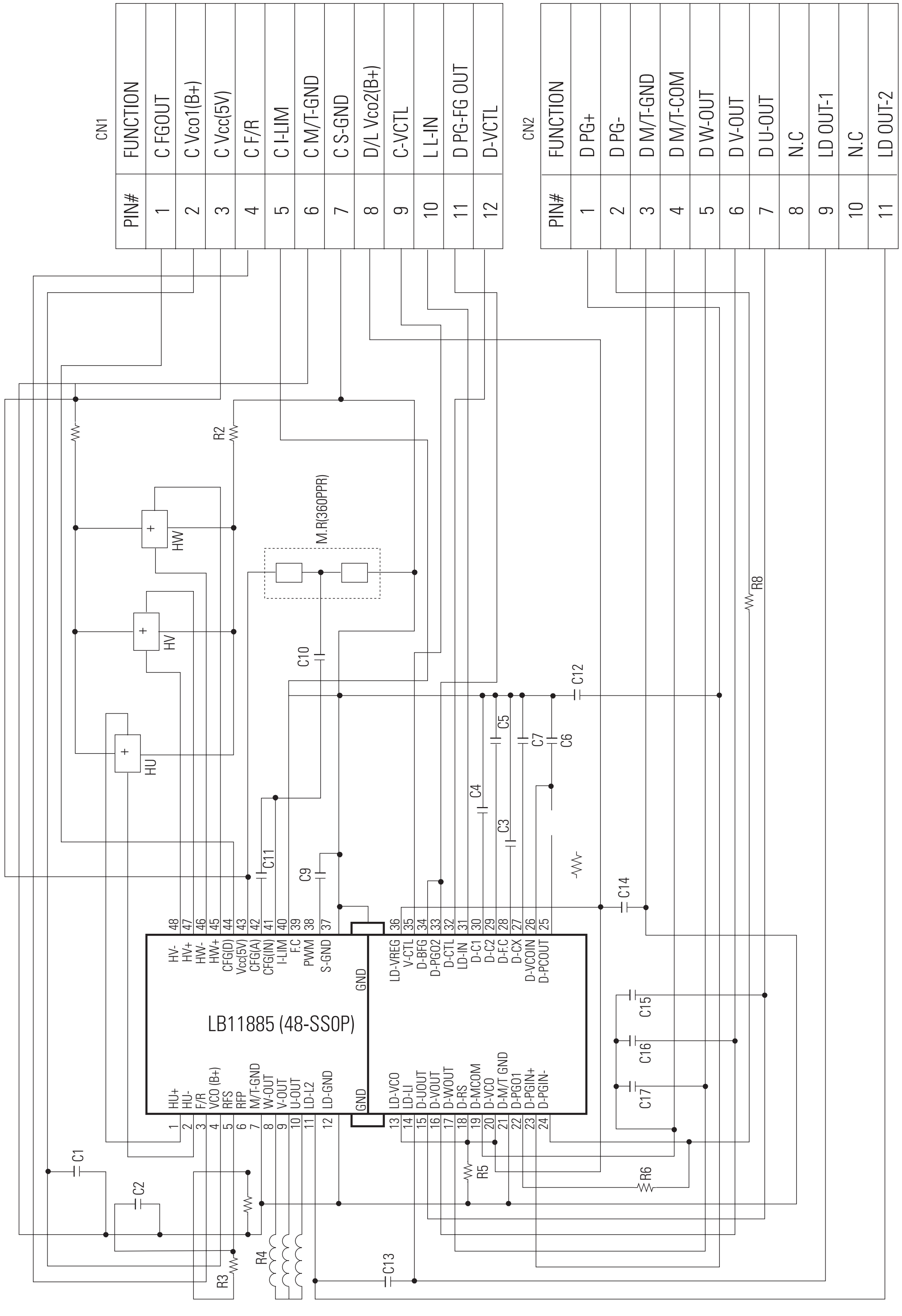
POSION	CAM S/W			START	ACTION MODE
	A	B	C	SEN	
STANBY	0	0	0	0	Eject
POWER OFF	0	0	0	1	Unload POWER OFF
LOADING START	0	0	0	1	(Tape loading start point)
LOADING END	1	0 1	1	1	(Tape loading end point)
REV	1	1	0	X	Reverse picture search, reverse SLOW
PLAY	0	1	0	X	Play, Rec, F-PS, Still, SLOW, F-ADV
STOP 1	0	0	1	1	Stop (Play position 5 Min. over)
STOP 2	0	0	1	X	(MAIN Break ON MODE)
FF/REW 1	1	0	0	X	High speed Rew, Low speed FF
FF/REW 2	0	1	1	X	High speed FF, Low speed Rew

(4) Motor Control

In case of Scorpio-2 Deck, Loading Motor Drive IC lies in Capstan Motor, not like Scorpio-1 Deck.
In detail, Capstan Motor Drive IC is designed to drive Loading Motor + Capstan Motor + Cylinder Motor in one IC. (See Fig. 14-14)

Table 2 : Motor Control Logic

CN604-PIN10	MOTOR
0 ~ 1V	**Reverse**
2 ~ 3V	**Stop**
4 ~ 5V	**Forward**


LB11885 (48-SSOP)
48 HV-
47 HV+
46 HW-
45 HW+
44 CFG(D)
43 Vcc(5V)
42 CFG(A)
41 CFG(IN)
40 I-LIM
39 FC
38 PWM
37 S-GND
GND
36 LD-VREG
35 V-CTL
34 D-BFG
33 D-PGO2
32 D-CTL
31 LD-IN
30 D-C1
29 D-C2
28 D-FC
27 D-CX
26 D-VCOIN
25 D-PCOUT
1 HU+
2 HU-
3 F/R
4 VCO (B+)
5 RFS
6 RFP
7 M/T-GND
8 W-OUT
9 V-OUT
10 U-OUT
11 LD-L2
12 LD-GND
GND
13 LD-VCO
14 LD-LI
15 D-UOUT
16 D-VOUT
17 D-WOUT
18 D-RS
19 D-MCOM
20 D-VCO
21 D-M/T GND
22 D-PGO1
23 D-PGIN+
24 D-PGIN-
HW
HV
HU
M.R(360PPR)
R2
R8
C10
C12
C5
C7
C6
C4
C3
C11
C9
C14
C15
C16
C17
C1
C2
R5
R6
R3
R4
C13

CN1

PIN#	FUNCTION
1	C FGOUT
2	C Vco1(B+)
3	C Vcc(5V)
4	C F/R
5	C I-LIM
6	C M/T-GND
7	C S-GND
8	D/L Vco2(B+)
9	C-VCTL
10	L L-IN
11	D PG-FG OUT
12	D-VCTL

CN2

PIN#	FUNCTION
1	D PG+
2	D PG-
3	D M/T-GND
4	D M/T-COM
5	D W-OUT
6	D V-OUT
7	D U-OUT
8	N.C
9	LD OUT-1
10	N.C
11	LD OUT-2

Fig. 14-15 Loading Motor + Capstan Motor + Cylinder Motor Block Diagram

(5) Stop Mode

The VCR enters the stop mode when the stop button is pressed during playback, record, rewind and fast forward mode. When trouble is detected, the VCR enters the stop mode to protect the tape and mechanism or when the tape reaches the end, etc.

- State Input ;
  Power switch on position.
  Stop button operation in all mode, except for timer recording and XPR.

(6) Play Mode

- State input ; Play button operated in stop, fast forward, rewind, forward search, reverse search, still mode, etc.,
- Indication output ;
  “PLAY” lights in LED Module.
- Output at ;
  IC601 Pin 46 (CAP F/R) : H

(7) Trick Play Mode

Trick play modes are classified into forward search, reverse search, still, slow and frame advance.
Audio signal is muted by pin 32 of IC601 (A.MUTE). V-lock is controlled by pin 24 of IC601.

(8) Forward Search Mode

7 Times play speed search in SP and SLP, 21 times play speed search in SLP.

- State input ; Press the fast forward button on the VCR front panel or the remote control in play or still mode.
- Indication output ; “FPS ” display in LED Module during 3 seconds.
- Output at ;
  IC601 Pin 46 (CAP F/R) : H
  IC601 Pin 32 (A.MUTE) : H

(9) Reverse Search Mode

7 times play speed reverse search in SP, 21 times play speed reverse search in SLP.

- State input ;
  Press the rewind button on the VCR front panel or on the remote control in play or still mode.
- Indication output ;
  “RPS” display in LED Module during 3 seconds.
- Output ;
  IC601 Pin 46 (CAP F/R) : L
  IC601 Pin 32 (A.MUTE) : H

(10) Slow Mode

- State input ; Press “ ⏯ “ button and then press “ ⏩“ button on the remote control.
  The slow speed can be changed when “ ⏩“ or “ ⏪“ button is pressed.
- Indication output ; “SLOW” lights in LED Module.
- Output at ;
  IC601 Pin 46 (CAP F/R) : H
  IC601 Pin 32 (A.MUTE) : H

(11) Play/Still Mode

The same track is traced by the video heads.

- State input ; Press “ ▶II “ button in play modes.
- Indication output ; “STILL” display in LED Module.
- Output at ;
  IC601 Pin 46 (CAP F/R) : H
  IC601 Pin 32 (A.MUTE) : H

(12) Record Mode

Must use a cassette with the safety tab.

Index signal is recorded on the control track of the tape at the start of recording.

- State input ;
  Press the record button during stop mode and record pause mode or at the preset time reached in the timer record mode. Press the REC button in stop mode.
- Indication output ;
  “REC” lights in LED Module in normal record mode, “0:30, 1:00, 1:30, 2:00, 3;00 or 4:00” display in timer XPR modes.
- Output at ;
  IC601 Pin 46 (CAP F/R) : H

(13) Record Pause Mode

The pinch roller is released from the capstan shaft in a moment.

The brake is applied to the take up reel to prevent tape slack during the record pause mode.

- State input ; Press “II “ button in the record mode.

Note : Inoperative during recording and XPR mode.

- Indication output ; “PAUSE”display in LED Module.

(14) Fast Forward Mode

Tape fast forward operation using capstan motor.

- State input ; Press the rewind button in the stop or fast forward modes.
- Indication output ; “FF” lights in LED Module.
- Output at ;
  IC601 Pin 46 (CAP F/R) : H

(15) Rewind Mode

Tape rewind operation using the capstan motor.

- State input ; Press the rewind button in the stop or fast forward modes.
- Indication output ; “REW” lights in LED Module.
- Output at ;
  IC601 Pin 46 (CAP F/R) : L

(16) Rewind Shut-Off Mode

Tape rewind operation then power off mode.

- State input ; Press the power button in the rewind mode.

(17) Trouble Detection

The trouble detection circuits are provided to protect the from damage (Fig. 14-15). The reel lock sensor detects incorrect rotation of supply and take up reel. The reel lock sensor consists of the disk and photo sensor installed at the bottom of the reel disk. the disk has 6 or 8 shielder parts and the photo sensor consists of the LED and photo transistor assembly. When the light is shielded by the the shielder or enters the photo transistor, the output is obtained from the photo sensor. IC601 measures the period of the pulse. When it is 4 seconds or more during record/play, the VCR enters the reel emergency mode.
The VCR maintains the unload-power-on state in the reel emergency.

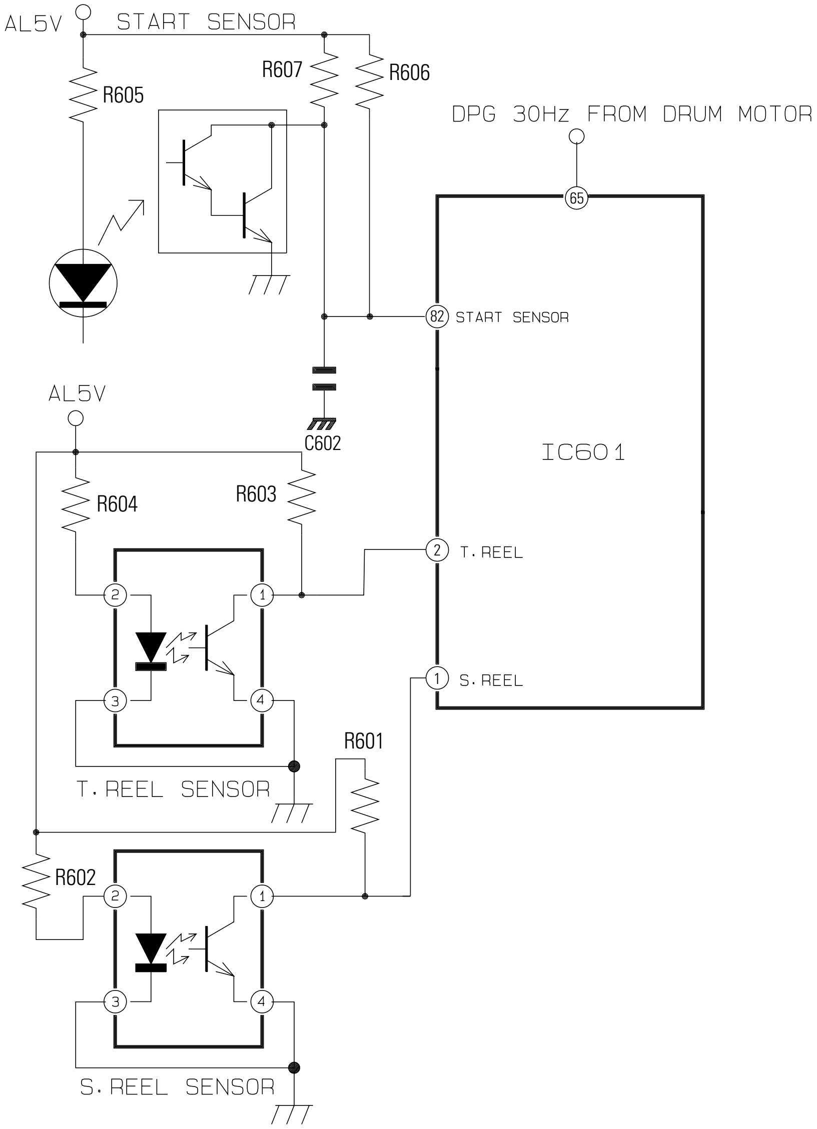


Fig. 14-16 Reel and Cylinder Lock T.END/S.END Sensor

(18) Cylinder Lock Sensor

If the frequency of D-FG is less than 230Hz or more than 430Hz during 500msec, and such stuation occurs 3 times contined, micom makes the VCR drum emergency.

(19) Tape End Sensor

When end sensor detects the transparent section at the end of tape, the VCR enters auto rewind mode, except during timer recording and OTR mode. The cassette LED emits light through the transparent section of tape to the photo transistors, which are installed at both ends of the cassette. When start sensor detects the start section of the tape during reverse search and rewind, the VCR automatically goes to stop mode.

(20) Tape Counter Control

Fig. 14-16 is a simplified diagram of the tape counter control circuit. The tape counter in the u-COM counts the control pulses derived from control head. The control signal on the control track of the tape is picked up by the control head and supplied to pins 74, 75 of IC601. The control pulse is amplified by the u-COM IC. The u-COM determines the tape direction so the counter counts up when the “CAP F/R”signal is Hi and the counter counts down when the “CAP F/R” signal is Low. By counting the control pulse, the counter data is supplied to the VF display. Counter displays the time and it is increased or decreased by one minute after counting 1800 control pulses. Counter mode is switched to clock mode when the display button is pushed or when the VCR goes to power off mode. When the Clear button is pressed, the counter is reset to “00 : 00”.
The tape counter has a memory stop function.

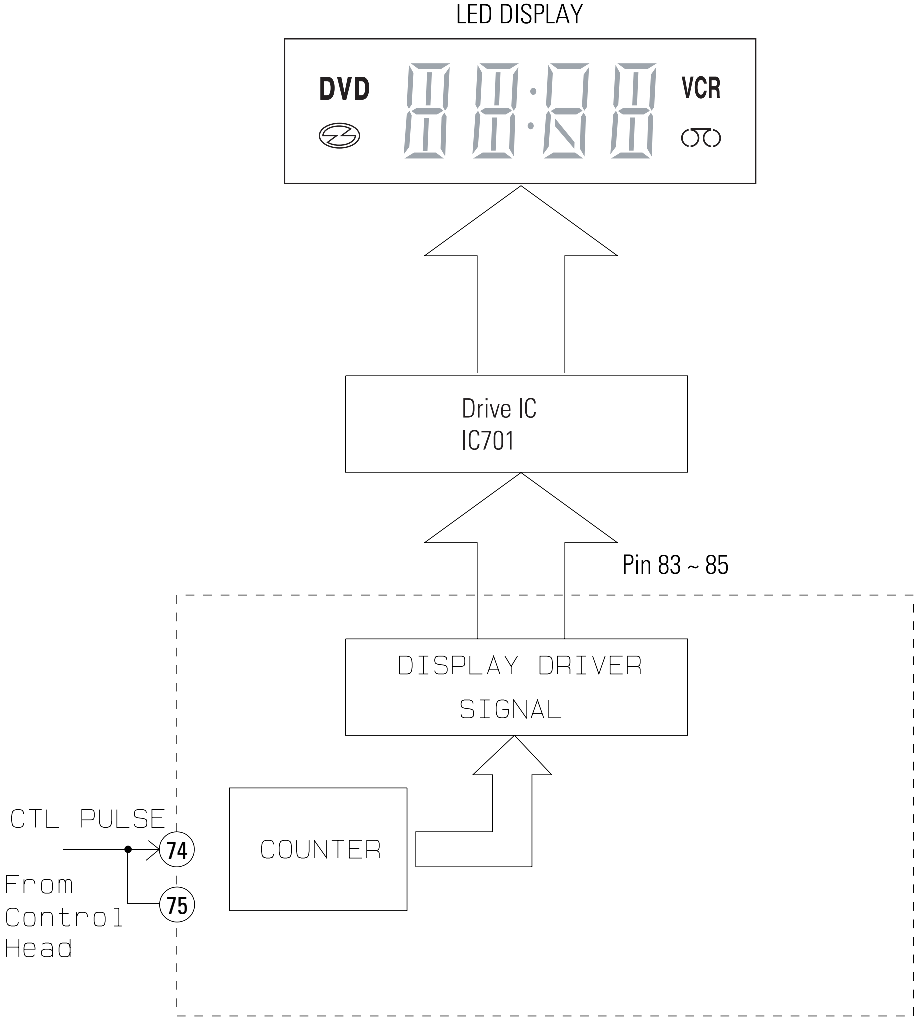


Fig. 14-17 Counter Display

(21) Timer/OTR Control

The timer can preset 12 programs in one month including daily and weekly programs.
Express recording lets the operator record up to 4 hours without programming the timer.

(22) Clock Display

The clock generator inside of the u-COM counts the oscillation signal of XT601 for the timer clock data.

(23) Power Failure Detection

u-COM goes to the power failure mode when the 88 port is lower than 4/5 of AD Vcc level.

(24) 4H'D Control

During trick play (still,slow,F-advance), it is necessary to control pre-amp,video circuit. the micom control pin 98 (C-ROTARY), pin 99 (HD-AMP) of the IC601 during PB period in Slow mode.
These port is applied to video IC to operate the trick play.

14-10 VCR Servo

(1) Outline

The servo system is divided into three loops. The cylinder servo controls the rotation of video heads, the capstan servo controls the tape speed, and the tension. In addition it's necessary to control cylinder motor, especially during trick play in 4H'D models. The tension servo maintains the tape tension constant: it keeps the compression strength of tape against the video heads at the optimum level so that a stable RF signal is produced during recording and playback. The tension servo operation is entirely mechanical. The cylinder servo loop controls the phase and speed of the cylinder motor. The speed is kept at a constant 1800 RPM and the
phase determines the mechanical position relative to the vertical Sync signal. The capstan servo loop controls the phase and speed of the capstan motor so that the video head can trace the video track correctly. It keeps tape speed constant according to the mode (SP, SLP)during playback and recording.

Table 3 : Servo System Signal

MOTOR	SYSTEM	MODE	REFERENCE SIGNAL	COMPARISON SIGNAL
CYLINDER (VIDEO HEAD)	PHASE	REC	V-SYNC	SW 30Hz
		PB	REF30Hz	
	SPEED	COMMON	8MHz	CYLINDER FG(720Hz)
(4H' D)	SPEED& PHASE	TRICK PLAY (STILL. SLOW)	MICOM CONTROL CYLINDER SPEED TO MATCH H-SYNC SPEED	
CAPSTAN	PHASE	REC	DIVIDED CFG PULSE	REF 30Hz
		PB	CTL 30Hz	
	SPEED	COMMON	8MHz	CAPSTAN FG
(4H' D)	SPEED& PHASE	TRICK PLAY (STILL. SLOW)	MICOM CONTROL CAPSTAN DRIVE SIGNAL WITH CAP C.L	

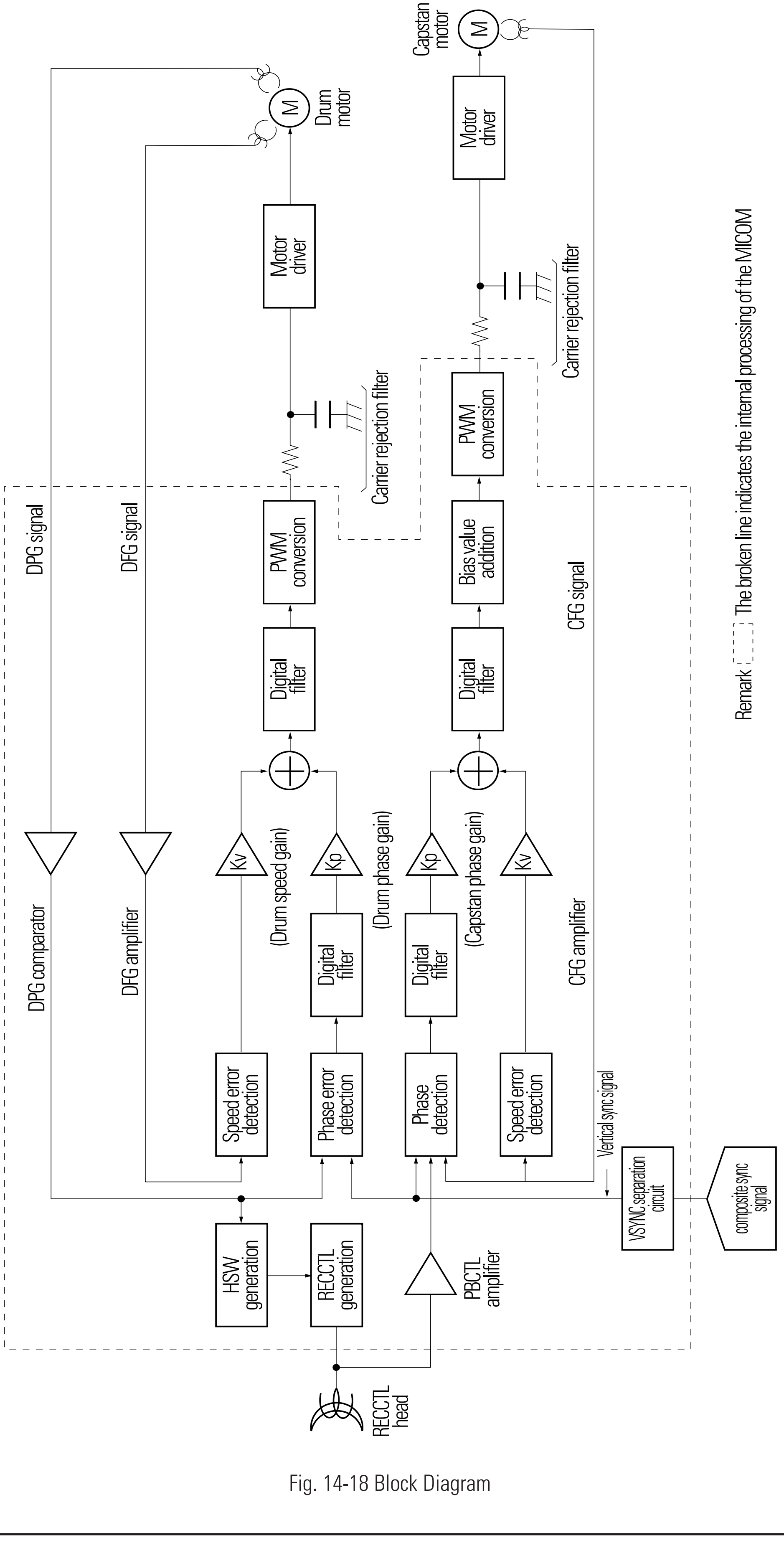

Capstan motor
M
Drum motor
Motor driver
Motor driver
Carrier rejection filter
Carrier rejection filter
PWM conversion
PWM conversion
Bias value addition
Digital filter
Digital filter
DPG signal
DFG signal
CFG signal
DPG comparator
DFG amplifier
CFG amplifier
Kv
Kp
Kp
Kv
(Drum speed gain)
(Drum phase gain)
(Capstan phase gain)
Digital filter
Digital filter
Speed error detection
Phase error detection
Phase detection
Speed error detection
Vertical sync signal
VSYNC separation circuit
composite sync signal
HSW generation
RECCTL generation
PBCTL amplifier
RECCTL head
Remark
The broken line indicates the internal processing of the MICOM

Fig. 14-18 Block Diagram

(2) Capstain Speed Error Detector

The capstan speed control operates so as to hold the capstan at a constant rotational speed, by measuring the period of the CFG signal. A digital counter detects the speed deviation from a preset value. The speed error data is added to phase error data in a digital filter. this filter controls a pulse-width modulate (PWM) output, which controls the rotational speed and phase the captain.
When the error is zero, the PWM circuit outputs a waveform with a 50% duty cycle.

The CFG input signal from the capstan motor is a square wave the CFG input signal is compared by a comparator and than sent to speed error detector as the CFG signal.

The speed error detector uses the system clock to measure the period of the CFG signal, and detects the deviation from a preset data value. The preset data is the value that would result from measuring the CFG signal period with the clock signal if the capstan motor were running at the correct speed.

The error detector operates by latching a counter value when it detects an edge of the CFG signal.
the latched counter provides 16 bits of speed error data for the digital filter to operate on.
The digital filter adds the speed error data to phase error data from the capstan phase control system,then sends the result to the pulse-width modulator as capstan error data.

(3) Capstain Phase Error Detector

The capstan phase error detector consists of a 16-bit counter, a capstan phase preset data register pair, a latch signal circuit driven by a feedback signal, and a captain phase error data register pair.

The capstan phase control in rec mode is executed by comparing HD S/W, which is synchronized with V-sync, with devided CFG signal. And than it does in playback mode by comparing HD S/W, which is synchronized with DFG and DPG, with PB CTL signal.

The latch signal for the phase error data in record mode is the devied CFG signal, which is devided from the CFG signal in the CFG frequency devider to a frequency of 30HZ.
In playback, the latch signal is the devied CFG signal obtained by frequency division from the rising edge of PB-CTL signal (playback control pulse signal).

The error data is a signed binary value centered on a phase error of zero (corresponding to the correct rotational phase). If the phase legs the correct phase ,the error is positive (+).
If the phase leads the correct phase, the error is negative (-).

(4) Drum Speed Error Detector

Drum speed control operates so as to hold the drum at a constant rotational speed, by measuring the period of the DFG signal. A digital counter detects the speed deviation from a preset value. The speed error data is added to phase error data in a digital filter. The filter controls a pulsewidth modulated (PWM) output,which controls the rotational speed and phase of the drum.

The DFG input signal from the drum motor is a square wave. The DFG input signal is compared by a comparator and than sent to the speed error detector as the DFG signal.

The speed error detector uses the system clock to measure the period of the DFG signal, and detects the deviation from a preset data value. The preset data is the value that would result from measuring the DFG signal period with the clock signal if the drum motor were running at the correct speed.

The error detector operates by latching a counter value when it detects an edge of the DFG signal. The latched count provides 16 bits of speed error data for the digital to operate on.
The digital filter adds the speed error data to phase error data from the drum phase control system, then sends the result to the pulse-width modulator as drum error data.

(5) Drum Phase Error Detector

Drum phase control must start operating after the drum motor is brought to the correct rotational speed by the speed control system . Drum speed control works as follows in record and playback.

- Record : Phase is controlled so that the vertical blanking intervals of the recorded video signal will line up along the edge of the tape.

- Playback : Phase is controlled so as to trace the recorded tracks accurately.

A digital counter detects the phase deviation from a preset value. The phase error data is added to speed error data in a digital filter. this filter controls a pulse-width modulated (PWM) output, which controls the rotation phase and speed of the drum.When the error is zero, the PWM circuit outputs a waveform with a 50% duty cycle.

The phase counter error detector compares the phase of the DPG pulse (tach pulse),which contains video head phase information, with a reference signal. In the actual circuit , the comparison is carried out by comparing the head-switching (HSW) signal,which is delayed by a counter that is reseted by DPG, with a reference signal. The reference signal is the REF 30Hz signal,which differs between record and playback as follows.

- Record : V sync signal extracted from the video signal to be recorded (frame rate signal, actually 1/2V sync).

- Playback : 30Hz signal divided from the system clock.

14-11 VCR Video

(1) Luminance Signal Recording System

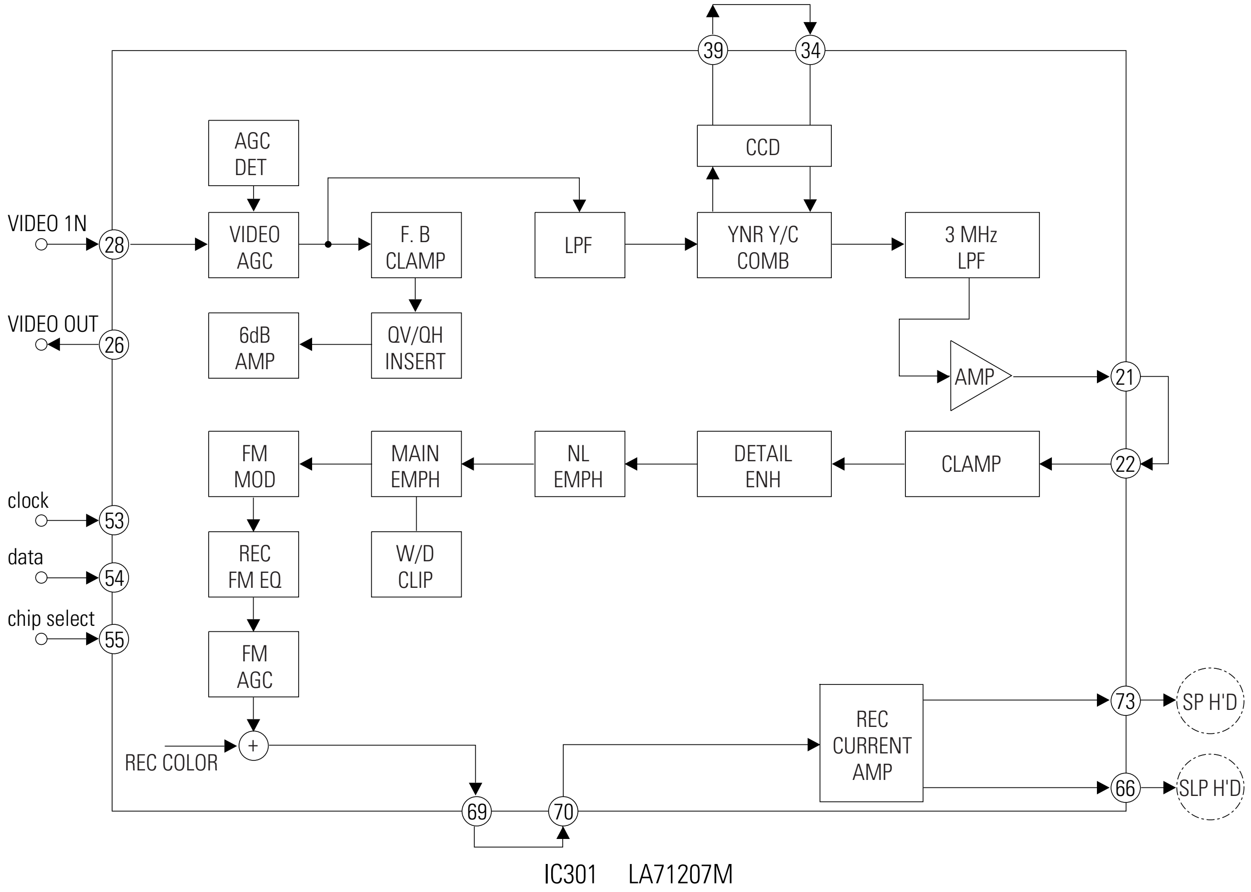

39
34
AGC DET
CCD
VIDEO 1N
28
VIDEO AGC
F. B CLAMP
LPF
YNR Y/C COMB
3 MHz LPF
VIDEO OUT
26
6dB AMP
QV/QH INSERT
AMP
21
FM MOD
MAIN EMPH
NL EMPH
DETAIL ENH
CLAMP
22
clock
53
data
54
chip select
55
REC FM EQ
W/D CLIP
FM AGC
REC COLOR
+
REC CURRENT AMP
73
SP H'D
66
SLP H'D
69
70
IC301 LA71207M

Fig. 14-19 Luminance Record Process

1) Outline

Fig. 14-18 shows the video signal recording system.
The selected video input signal goes to pin 28 of Luma/Chroma processor IC (IC301). And then it enters VIDEO AGC circuit. The gain of AGC circuit is controlled by AGC detector so that the output is constant (approx. 2Vp-p). The output signal of AGC is clamped by the FBC(Feed Back Clamp) circuit. This signal appears at pin 26, after being amplified at the internal video amp and driver.
The output signal from the clamp circuit enter the detail enhancer circuit. In the detail enhancer circuit, the low level high frequency video signal is emphasized to improve the original signals frequency characteristics.
onlinear emphasis circuit is employed to improve S/N and frequency response characteristics together with the following main emphasis. Noise effects the FM wave at a higher frequency, so the S/N can be improved by emphasizing the higher frequency before recording and by suppressing the play signal during demodulation.
The difference of non linear emphasis from main emphasis is that the emphasis characteristics change is depending on the input level. The gain of the emphasis circuit is inversely proportional to the level of the high frequency component of the signal. That is, if the high frequency portion of the signal is low the main emphasis circuit will amplify the signal.

2) Main Emphasis Circuit

The dynamically emphasized luminance signal is now supplied to the main emphasis circuit where all the high frequency components of the signal are boosted more than the low frequency components. The boosting action is required for the high frequency components because in the FM recording method, the noise of the playback signal increases in proportion to the modulated signal frequency or low level signal. By using the nonlinear emphasis and main emphasis system, the total S/N ratio is increased. The output of the main emphasis circuit is then supplied to the white and dark clip circuit.

3) White and Dark Clip Circuit

After emphasis is performed, large overshoots and undershoots in the luminance signal are limited to a specified level. This is done to avoid FM over modulation. The output of the main emphasis circuit is then supplied to the FM modulator circuit.

4) FM Modulator

A. The amplitude of the FM signal is limited, so the signal is recorded on tape near the maximum record level which increases the S/N ratio.

B. The FM carrier is se to 3.4MHz (at the Sync tips) and the deviation to 4.4MHz by inside IC circuit (for the white peak). The actual device which constitutes the FM modulator is a stable multivibrator.

This multivibrator generates a sine wave output of variable frequency.

The frequency of sine wave is governed by the level of the processed video signal at any given point. Therefore, the processed video signal varies the frequency of the sine wave which is frequency modulation (FM). During playback in SLP mode, the crosstalk of the adjacent track is more apparent than is standard mode. It appears as jitter and noise on the monitor. To reduce this noise from the screen, the FM carrier frequency has to be 1/2fh shifted up during recording. This is done by applying the head switching pulse to the FM modulator control pin57 during SLP recording. The FM modulated luminance signal goes to record equalizer circuit and it is mixed with chrominance signal at the record Amp circuit inside video IC.

5) Record Amp

The frequency modulated luminance signal and chroma signal are mixed in the record amp of pre-amp block inside video IC. Then this mixed signal is amplified and supplied to the video heads via the rotary transformer and recorded on the magnetic tape.

Tape speed selection determines which video heads will be used. That is, signal output from pin 66 (SLP) and 73 (SP) of pre-amp block are supplied to video heads.

Control signal of speed mode is applied to pin 53(clock), 54(data), 55(chip select) of video IC from Micom IC.

(2) Luminance Signal Playback System

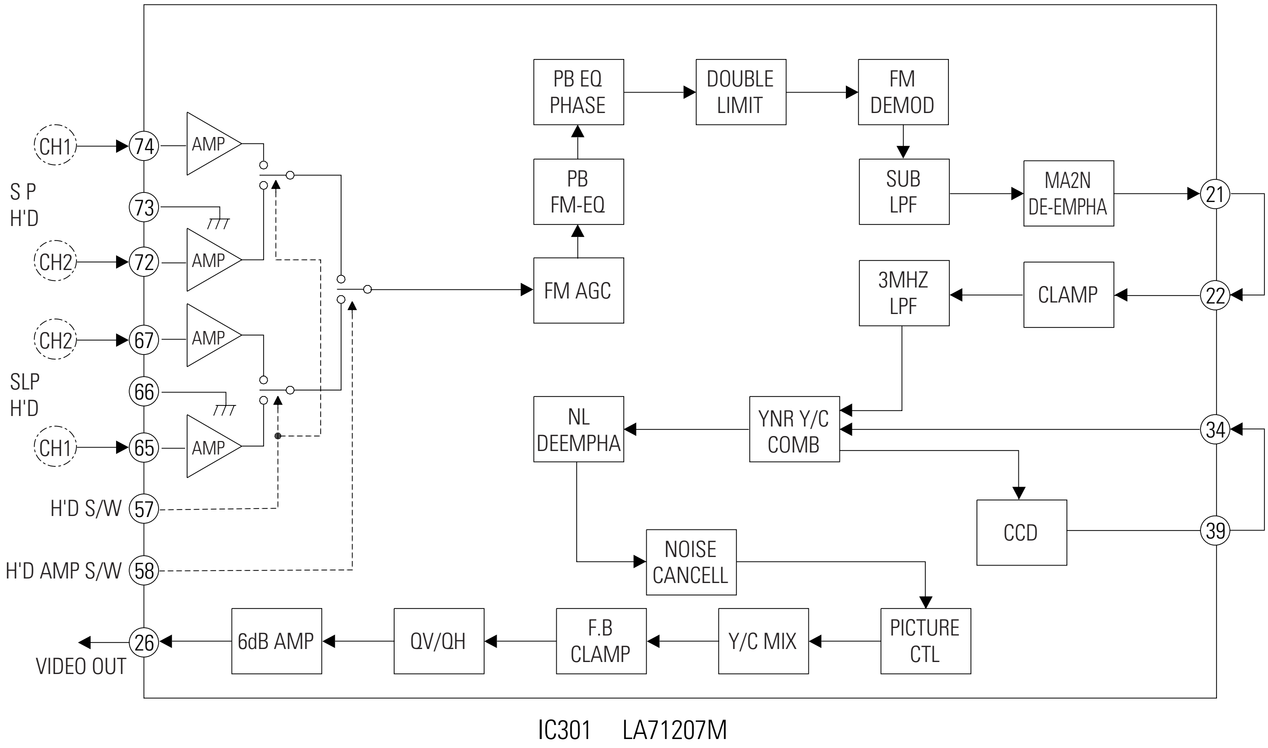

CH1
74
AMP
S P
H'D
73
CH2
72
AMP
CH2
67
AMP
SLP
H'D
66
CH1
65
AMP
H'D S/W
57
H'D AMP S/W
58
26
VIDEO OUT
6dB AMP
QV/QH
F.B CLAMP
Y/C MIX
PICTURE CTL
NOISE CANCELL
NL DEEMPHA
YNR Y/C COMB
CCD
FM AGC
PB FM-EQ
PB EQ PHASE
DOUBLE LIMIT
FM DEMOD
SUB LPF
MA2N DE-EMPHA
3MHZ LPF
CLAMP
21
22
34
39
IC301 LA71207M

Fig. 14-20 Luminance Playback Process

1) Outline

The video signal recorded on the tape is picked up by CH1,CH2 head and is supplied to pre-amp block via rotary trans. During playback, as per the speed, SP and SLP head is determined by Pin60 of respectively.
CH1 signal inputs to Pins 65 and 74 while CH2 signal inputs to Pins 67 and 72 of video IC. The pick up operation is controlled by the head switching pulse inputted to pin 57. During the high portion of the switching pulse, CH2 is picked-up and just the opposite is true for CH1. In the pre amp IC, the FM signal is amplified 60dB and this signal is applied to FM AGC.

2) FM AGC AMP

At the FM AGC Amp (FM), signals are automatically balanced. One of the AGC circuit outputs is fed to AGC detector circuit which detects signal level fluctuations. The detector output signal is applied to the FM AGC Amp to keep the output constant.This output is applied to the PB FM EQ block. FM EQ is correct the phase distortion and level. The signal through PB EQ circuit is applied to the double limiter.

3) Double Limiter Circuit

A FM signal on the tape which contains AM components will be read during playback. If there is a severe AM component, a drastic drop in FM carrier can occur. This lack of FM carrier can be called a noise region. Double limiting is used for improving the S/N ratio and carrier loss. The playback FM signal is split into two paths, one goes to high pass filler and sub-limiter. The other goes to the main-limiter after passing through a LPF. ONE path of the FM signal goes to the high pass filter, so that the low frequency(AM) component can be removed, and the other carrier is supplied to the sub-limiter. The output signal of sub-limiter is mixed with the signal from the low-pass filter and sent to the FM demodulation circuit.

4) FM DEMODULATOR

The FM demodulator consists of a stable mono multivibrator balanced modulator (BM) and a LPF. The FM demodulator circuit first converts the FM signal to a pulse width modulator signal. Then the circuit smoothes the PWM signal to demodulate the video signal. This demodulated signal is fed to the LPF to remove its FM carrier component and any other harmonics. The demodulated luminance signal outputs from Pin 21 and is applied to the 3MHz LPF through main deemphasis circuit. To reduce demodulation noise, the output of the 3MHz LPF is applied to a non-linear deemphasis circuit through YNR circuit.

5) Main De-emphasis Circuit

Before modulation, main emphasis was performed. Because the high frequency components of video signal were boosted more than the low frequency components in the recording mode, main deemphasis must be performed to obtain a normal video signal. That is this circuit returns the emphasized high frequency component to the original value.

6) Non Linear De-Emphasis Circuit

This circuit is the counter part of the dynamic pre-emphasis circuit during recording. The characteristics are also the opposite of those in recording.

7) Drop Out Compensator/YNR Circuit

This circuit compensated for missing parts of the FM signal due to dust, dirt on the tape or irregular tape coating, etc. The clamped video signal is supplied to the CCD 1H circuit. The 1H delayed video signal from CCD block is also supplied to the 6MHz LPF to reject the sampling noise of CCD IC.

Then, the output of LPF is applied to Pin 34 of video IC. When the DOC detector detects the FM loss, a 1H delayed video signal is added in place of the missing signal.

8) Noise Canceller Circuit

The noise canceller circuit removes the high frequency noise contained in the video signal which has the reverse characteristics of the detail enhance in the recording mode. The output of the noise canceller circuit is supplied to the Luminance and Chrominance mixer circuit. The mixed chroma and luminance signal are then output at Pin 26.

(3) Chroma Signal Recording System

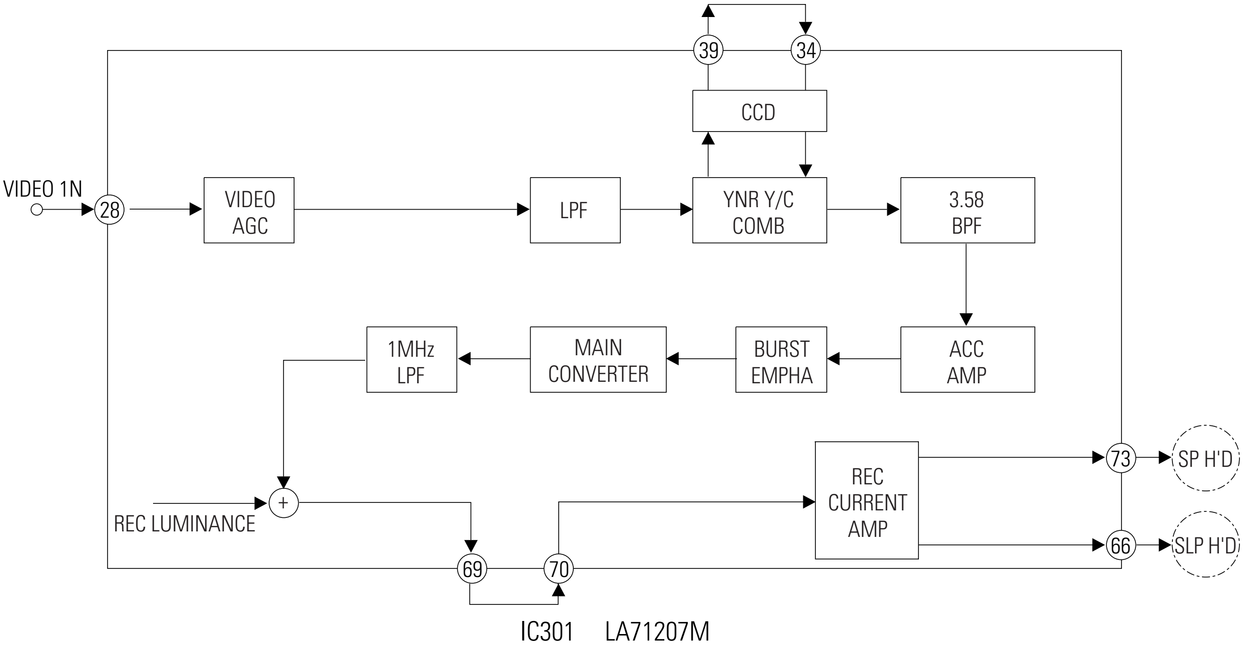


Fig. 14-21 Chrominance Record Process

1) Outline

Fig. 14-21 shows the chroma signal recording system. The chroma signal recording process is performed by video IC. The input video signal is fed to Pin 28 of IC and supplied to Y/C COMB circuit through AGC AMP.

The output signal of Y/C COMB circuit is applied to ACC amplifier. The ACC amplifier is used for both burst ACC which keeps the burst level at a constant value in recording and the color ACC which controls the reference level of the burst ACC with the color signal level. The color ACC works to maintain a relatively high output level by boosting low level input signals to improve color S/N ratio. The signal is then applied to the burst emphasis circuit. Burst emphasis emphasizes the burst signal by +6dB during recording and feeds it to the main converter.

The 3.58MHz signal are mixed in the main converter to perform frequency conversion.

The main converter is a mixer having the two types of output components which are the added frequency of 4.21+3.58=7.8MHz and the difference frequency component 629KHz.

Added frequency is rejected by the 1MHz LPF and the 629KHz down converted chroma signal is supplied to the luma/chroma mixer of pre-amp block and then recorded on the tape via the record amp and heads.

AFC detection is performed with the head switching pulse and the fh signal generated from 321fh VOC output.

The detector output controls the VCO frequency which will be locked precisely at 320fh (5.035MHz).

he 320fh signal is counted down to 1/8 and the resultant 40fh (=629KHz)carrier signal is phase shifted triggered by each horizontal sync signal which is wave shaped as a 50% duty pulse by the pulse generator.

The direction of the rotational phase shift depends on the levels of the rotary head switching signal from pin 57 and when the switching signal is "H" level, the phase is retarded by 90 degrees for every 1H, and when is is at a "L" level it will advance by 90° for every 1H this 40fh phase shifted sub-carrier (PSSC) signal enters the sub-converter and the 3.58MHz carrier signal is locked at the color burst frequency by the record APC.

The PSSC signal is frequency converted into 3.58MHz +/-629KHz. Then 4.21MHz component (=3.58MHz+/-629KHz)is extracted through a 4.2MHz BPF.

The 4.21MHz signal is used as a carrier signal for down conversion of the color signal as described previously.

2) ACC (Automatic Color Gain Control) Circuit

The ACC is used as burst ACC in the LP mode, however it is also used for peak ACC in the SP/SLP mode.
The purpose of using two different ACC operations is to improve the overall Chroma S/N ratio during playback. In SP and SLP, there is H-sync alignment. This indicates that there is bust alignment as well. Whenever two video tracks overlap or a video head picks up crosstalk from an adjacent track, beats are produced during playback. Perhaps the most noticeable beats are produced by H-sync and burst. But in SP and SLP, these beats occur right at H-sync and burst and are out of the picture. In LP, however, there is no H-sync alignment and these beats can be seen in the picture. To keep the beats at a minimum in LP, we keep the burst level constant so that the beat intensity is constant. We know that ACC acts to improve the color S/N,and in LP, the ACC detector locks at the burst level,and keeps it constant. Thus we have ACC operation with the least beats. In SP and SLP, the beats caused by burst overlap are out of picture, so we don't really mind if the burst level changes or not. To improve the color S/N ratio even more,we use peak ACC in SP and SLP.That is,if the chroma level is too low to record, the amplification degree is increased by 3dB. However, the chroma level is sufficient for recording, this peak ACC is changed to burst ACC to avoid over amplification. By changing the ACC according to picture color content, the burst level may vary. The color ratio improvement is based on the color content itself during SP and SLP provides a somewhat better S/N ratio.

3) Four (4) Phase Rotation

CH1 is advanced 90° every channel, while CH2 is delayed 90°. When the frequency is set to 629KHz, if phase is shifted by +/-90 it becomes 629KHz +/-90. The 40fh+/-90 (=629KHz +/-90)is balanced modulated via fsc (3.58MHz) depending on which side band is detected. That is, the fs +40fh+/-90 (4.2MHz +/-90) of total frequency is supplied to the main converter. In record mode, the signal operates same as in play back mode. During playback, the phase is returned to original state.

4) AFC (Automatic Frequency Control) Circuit

Luminance signal is input to H-sync separator. The H-sync is separated and supplied to phase comparator.
This signal can be described as fh (Horizontal Sync frequency of input video signal). However, VCO oscillates at 320fh (5.035MHz). This 321fh is counted down by 1/8 and 1/40 and resultant fh is supplied to phase comparator. fh and fh are supplied to the phase comparator for comparison of their phases.
After comparison, the phase
differences is output to VCO (320fh) in terms of error voltage. Therefore, the oscillation frequency of VCO is controlled by this error voltage. That is, if the fh phase is changed by H-sync signal fh, error voltage is changed accordingly and if the phases of fh and fh are met due to change of VCO oscillation frequency, error voltage does not feedback. 320fh VCO is oscillated in accordance with phase sync at fh. Therefore, 40fh input to sub converter by phase shift is always sync horized with phase.
The AFC loop performs the same operation during record and playback. In recording, phase of VCO is in accordance with H-sync signal of current video signal.
Which in playback, the phase sync of VCO is consistent with H-sync signal which is separated from the video signal.

(4) Chroma Signal Playback System

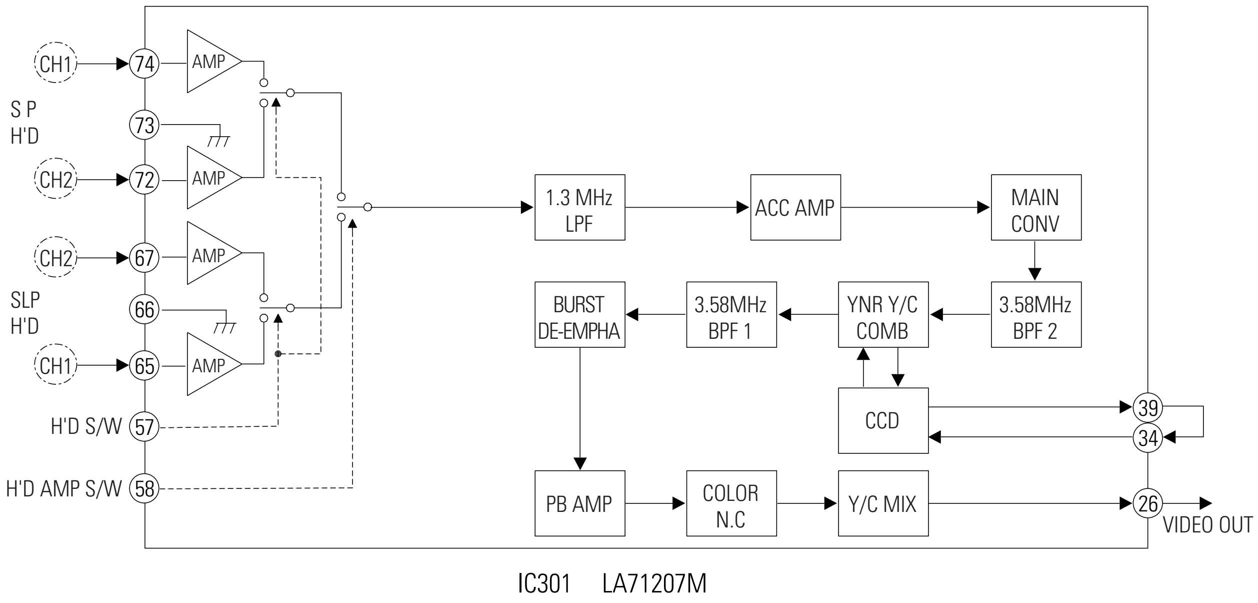


Fig. 14-22 Chrominance Playback Process

1) Outline

Fig. 14-22 shows the chroma signal playback system.

The FM signals picked up by the CH-1 and CH-2 video heads are supplied to the pre-amp block.

The FM signal from CH-1 and CH-2 are alternately selected by the switch and output signal as a continuous signal. Goes to the ACC amp through the 1.3MHz LPF. The 1.3MHz LPF is used for passing only down converted 629KHz chroma signal in the playback mode. The ACC amp stabilizes the 629KHz color signal level.

The output color signal from amp then enters the main converter circuit. In the main converter circuit this signal is mixed with the 4.21MHz phase shifted carrier signal and converted into 4.21MHz + 629KHz signals.

2) Main Converter

Inside of IC, the main converter converts the 629KHz rotational chroma signal to a 3.58MHz non-rotational signal. The two inputs of this main converter are the 629KHz signal, which comes from the output of the ACC, and a 4.21MHz which has the same rotational phase as the 629KHz signal. It is important that the rotational phase of the 4.21MHz signal is the same direction as the 629KHz playback chroma signal. To obtain the 3.58MHz non-rotational stable signal, the same direction rotational signal should be mixed with the rotational chroma signal.

During the conversion process, the phase is also mixed by the frequency. Therefore, when 629KHz is subtraced from 4.21MHz,the result is the non-rotational 3.58MHz stable signal. The output signal of the main converter goes to the 3.58MHz BPF. In the 3.58MHz BPF,the conversion noise(4.21MHz+629KHz=4.8MHz) is rejected and the 3.58MHz color signal goes to the comb filter.

In the comb filter, the crosstalk components due to the adjacent track are eliminated and the color signal is applied to PB-AMP, BURST De-Emphasis, Killer and are applied to LUMA and CHROMA mixer input through the CNC block.

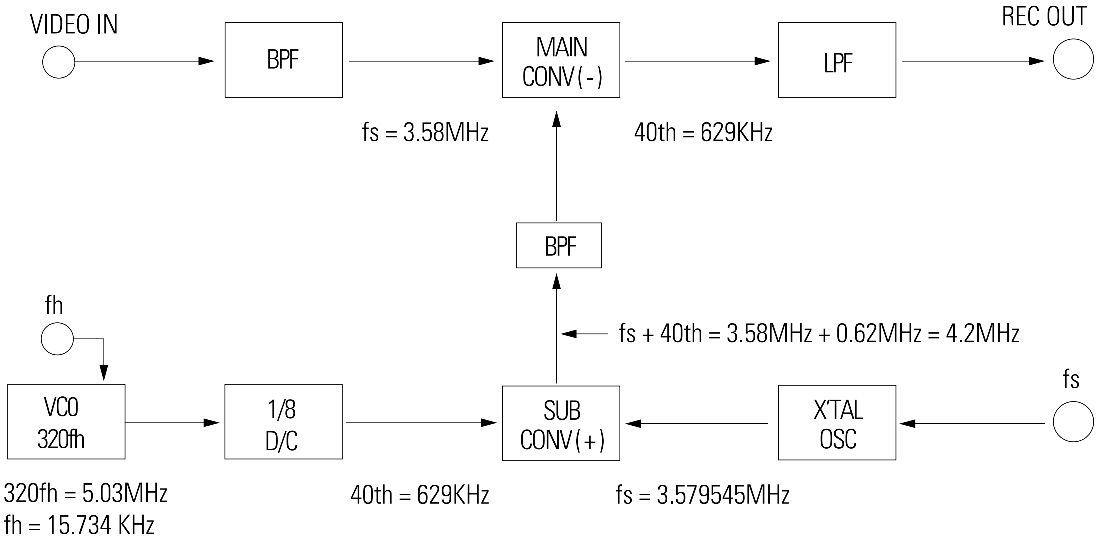

VIDEO IN
BPF
MAIN CONV(-)
LPF
REC OUT
fs = 3.58MHz
40th = 629KHz
BPF
fh
fs + 40th = 3.58MHz + 0.62MHz = 4.2MHz
fs
VCO 320fh
1/8 D/C
SUB CONV(+)
X'TAL OSC
320fh = 5.03MHz
fh = 15.734 KHz
40th = 629KHz
fs = 3.579545MHz

Fig. 14-23 Block Diagram of Color REC mode by the method of a Down Converter

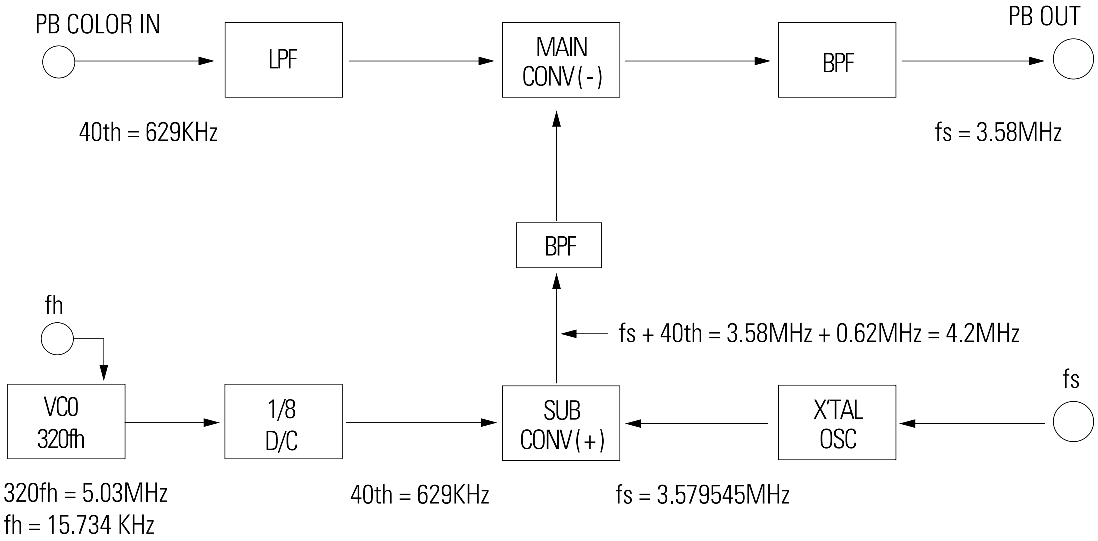

PB COLOR IN
LPF
MAIN CONV(-)
BPF
PB OUT
40th = 629KHz
fs = 3.58MHz
BPF
fh
fs + 40th = 3.58MHz + 0.62MHz = 4.2MHz
fs
VCO 320fh
1/8 D/C
SUB CONV(+)
X'TAL OSC
320fh = 5.03MHz
fh = 15.734 KHz
40th = 629KHz
fs = 3.579545MHz

Fig. 14-24 Block Diagram of Color PB mode by the method of a Down Converter

14-12 Hi-Fi Audio

(1) Outline

Hi-Fi circuit consists of HiFi audio LPF,VCO,BPF,FM detect circuit and switching noise compensator, PRE-AMP etc. Linear audio consists of an ALC circuit,REC EQ circuit and a PB EQ circuit.
Hi-Fi and Linear audio share the same input selector,output selector and mute circuit.

1) REC Mode (L-CH Only)

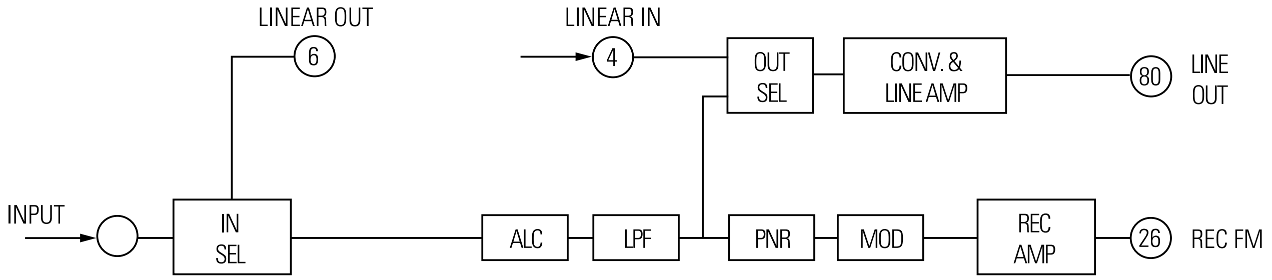

LINEAR OUT
6
LINEAR IN
4
OUT SEL
CONV. & LINE AMP
80
LINE OUT
INPUT
IN SEL
ALC
LPF
PNR
MOD
REC AMP
26
REC FM

Fig. 14-25 REC Mode (L-CH Only)

2) PB Mode (L-CH Olny)

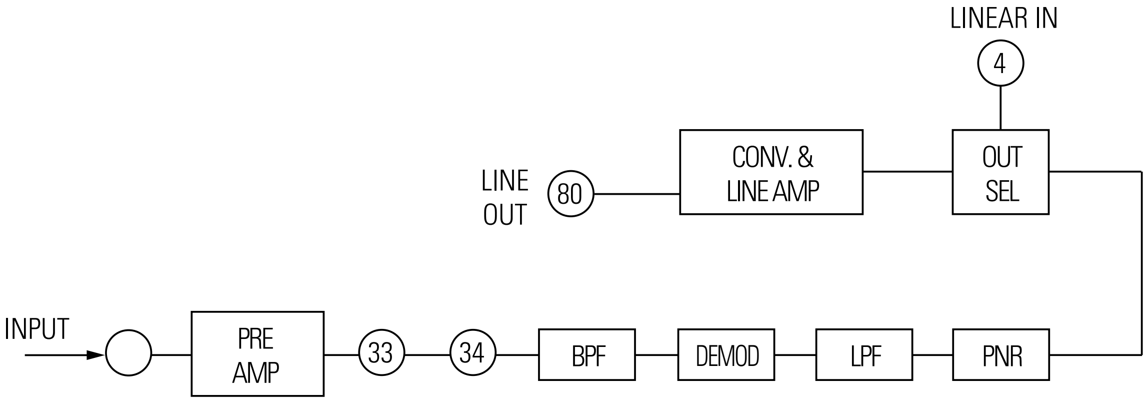

LINEAR IN
4
LINE OUT
80
CONV. & LINE AMP
OUT SEL
INPUT
PRE AMP
33
34
BPF
DEMOD
LPF
PNR

Fig. 14-26 PB Mode (L-CH Only)

(2) Block Description

1) Input Selector

Input selector outputs 1 signal from 4 different signals received. It outputs 1 selected signal from tuner,rear,front.

2) Normal(Linear) Selector

Two signals,L-CH and R-CH are inputed to Hi-Fi IC.But,linear audio is capable of receiving only one signal.Therefore,the
2 input signals must be selected. Usually,the outputs are mixed signals of L-CH and R-CH unlike the input selector,the normal selector does not amplify the selected signal.

3) Output Selector

It selects to output Hi-Fi L-CH,Hi-Fi R-CH,LINEAR and MIX(Hi-Fi+LINEAR) signals with the final output IC pin 78 (R-CH) and pin 80 (L-CH).

4) Output ALC(Convertor)

ALC is used because when the input level of RF converter gets bigger,it shows up as noise on the screen. But,this block is not used this model(ALC OFF)

5) PNR(Peak Noise Reduction)

It is a type of emphasis,de-emphasis function to eliminate noise during modulation /demodulation PNR operates as that of VHS FORMAT to reduce noise.

6) Audio Limiter

Before modulating the signals from PNR block,it limits signals exceeding the size limit to max deviation of +/-150KHz.

7) VCO(Voltage Control Oscillation)

It is a modulation functionthat oscillates 1.3MHz (L-CH) and 1.7MHz (R-CH).

8) RF LPF

It is a function to eliminate the harmonic components of Hi-Fi carrier formed during VCO,which may affect other block. It's pass-band approximately 2MHz.

9) MIXER

It mixes the Hi-Fi carrier formed in L-CH and R-CH. However,due to the frequency difference between L-CH and R-CH,when equal amount of R-CH is recorded to tape,R-CH is must smaiier than L-CH.
Therefore,the R-CH output is approximately 10dB bigger than L-CH.

10) Current Amp

It is the final amplifier of the mixed Hi-Fi carrier IC pin 28's resistance controls current, which change the size of IC pin 26.

11) AGC(Auto Gain Control)

It maintains uniform size of Hi-Fi envelope,which is inputed by pre-amp in play back mode.

12) BPF(Band Pass Filter)

L-CH and R-CH each has BPF. The center frequency is same as carrier frequency.
It is used to receive only Hi-Fi carrier from all signals inputed to pre-amp.

13) SW Noise Compensation

Unlike the linear audio,insted of using fixed head,drum heads are used,which creates halting points However,in order for the audio to be headed continuously,the damages from halting points are modulated,which creates noise. SW noise compensation is a block to minimize this particular noise.

14) Hold Pulse

It makes standard signal(Pulse) to compensate SW noise.

15) DET(Hi-Fi/LINEAR)

From the Hi-Fi envelope inputed from pre-amp,it decides whether the signal passing through L-CH BPF is Hi-Fi or LINEAR tape it's size(the signal passing through BPF is below 10mVpp, it is not Hi-Fi,therefore,it output linear)

16) DOC(Drop Out Compensation)

If demodulation is conducted without properly treating the damage on Hi-Fi envelope caused by scratch on the tape,noise occurs. In order to improve this noise occurrence,DO DET compensate the drop-out using the same methode of compensating the switching noise when the damage on the envelope ranges 10~15mVpp.

17) ENV DET

To obtain optimal tracking,envelop must be peak to peak and micom should be in DC. It is a function to convert Hi-Fi envelop to DC. If it is lower than 0.8V at micom,it sends linear mode date to HiFi IC.

18) Serial Data Decoder

It receives IIC BUS to enable the operation of inner block and decodes into serial data.

(3) Pin Port Description (Tuner Mode ; 1KHz, 100% Modulation Input)

PIN NO.	PIN NAME	DC VOLT.	SIGNAL	REMARK
1	LINE MUTE	0 / 5	-	Reduce the line out noise.
2	Linear out to TM	4.2 V	-17 dbm	Converter Model Only
3	Vcc 9V	9 V		Power Supply for in/out Select
4	Linear Input	2.5 V	- 28.2 dBV	Audio from A/V IC
5	Vcc 5V	5 V		Power Supply for in/out Select
6	Linear out ti A/V	2.5 V	-21.5 dBV	Audio out to A/V IC
7	EXT1-INPUT (L)	0	-28.2 dBV	Line Input 1 (FRONT)
8	ALC Detector	-		ALC Detector for RF converter
9	EXT2-INPUT (L)	0	-28.2 dBV	Line Input 2 (REAR)
10	GND	-		
11	EXT3-INPUT (L)	0	-28.2 dBV	Line Input 3 (DVD)
12	Monitor Input (L)	2.5 V		DVD Audio (L) Input
13	Input changeover switch output (L)	2.2 V	-21 dBV	PB/REC sitch output . Transform R/P signals into DC.
14	ALC Input (L)	2.5 V	-21 dBV	ALC Input Terminal
15	Vcc 5V	5 V		Power Supply for in/out Select
16	1/2 Vcc	2.5 V		1/2 Vcc Terminal
17	Rec Mute Terminal	0 V		GND (Not in use)
18	NR Waiting Det	-	-	Terminal for waiting dector
19	NR Waiting Filter	2.5 V		NR Waiting Filter 1 For L-CH
20	NR Waiting Filter	2.5 V		NR Waiting Filter 2 For L-CH
21	CCA Reference			CCA Reference for L-CH
22	NR Empha			NR Empahasis for L-CH
23	Tracking DC out	0 ~ 5 v		Hi-Fi Env Det Level Output
24	Audio Pb FM1	2 V / 4 V		Audio Playbak FM 1 input (H)
25	GND			Hi-Fi PRE-AMP GND
26	REC Current OUT			Rec current out to Head
27	Audio Pb FM2	2 V / 4 V		Audio Playbak FM 2 input (L)
28	Crrent adjust	2.4 V		Rec Current adjust point
29	Alc detector			ALC detection
30	Hi-Fi detector			Hi-Fi/ Normal detect
31	Monitor	2.5 V		FM Monitor
32	Vcc 5V	5 V		Power Supply for Hi-Fi
33	Pb FM Out	2.5 V		Output of H'D Amp in PB Mode
34	Pb FM Input	-	350 mVp-p	Input of FM in PB Mode
35	GND			GND FOR LOGIC
36	Vcc 5V	5 V		Power Supply for LOGIC
37	Serial data input	0 / 5 V		
38	Serial clock input	0 / 5 V		
39	Audio head s/w	0 / 5 V		Head s/w 30 hz input
40	Mts Mode out			1V : mo / 2V : St / 3V : Bi

PIN NO.	PIN NAME	DC VOLT.	SIGNAL	REMARK
41	CCA Reference			CCA Reference for R-CH
42	NR Empha			NR Empahasis for R-CH
43	NR Waiting Filter	2.5 V		NR Waiting Filter 2 For R-CH
44	NR Waiting Filter	2.5 V		NR Waiting Filter 1 For R-CH
45	NR Waiting Det	-	-	Terminal for waiting dector
46	Vcc 5V	5 V		Power Supply for in/out Select
47	ALC Input (R)	2.5 V	-21 dBV	ALC Input Terminal
48	Input changeover switch output (R)	2.2 V	-21 dBV	PB/REC sitch output . Transform R/P signals into DC.
49	Mute Control			
50	GND			GND FOR ANALOGE
51	FSC IN		200 mVp-p	3.58 Mhz input
52	DC Reg	1.2 V		Bandgap Power supply for MTS
53	Stereo PLL filter	3.8 V		LPF for Stereo PLL
54	Vcc 5V	5 V		Power Supply for MTS Select
55	Pilot Canceller f	3.8 V		CTL Pin of cancel signal for pilot C.
56	FM Filter			Filter for making stable dc
57	SIF Input			SIF Audio input from TM Block
58	REG Filter	4.5 V		Filter of reference voltage source.
59	Filter Auto Adjust	3.8 V		Loof filterof PLL for auto adj
60	Pilot Det Filter	3.8 V		Detection for pilot detection circuit
61	PC_DC_MO	3.3 V		Absorbing the DC offset
62	PCDOUT	3.8 V		Absorbing the DC offset
63	PCDIN	3.8 V		Absorbing the DC offset
64	PCDBXIN	2.6 V		Absorbing the DC offset
65	Main V/I convert	3.8 V		Converting the voltage of signal
66	SPE Det V/I convert	3.8 V		Connecting pin of smooth capacity of detection circuit.
67	Spectral DET			Converting the voltage of signal
68	Wide Band Det			Connecting pin of smooth capacity of detection circuit.
69	EXT1-INPUT (R)	0	-28.2 dBV	Line Input 1 (FRONT)
70	GND			GND FOR MTS
71	EXT2-INPUT (R)	0	-28.2 dBV	Line Input 2 (REAR)
72	Wid det V/I convert	3.8 V		Converting the voltage of signal
73	EXT3-INPUT (R)	0	-28.2 dBV	Line Input 3 (DVD)
74	Monitor Input (R)	2.5 V		DVD Audio (R) Input
75	PCDCOSPE			Absorbing the DC offset
76	PC_OUT_DBX	3.3 V		Absorbing the DC offset
77	LINE MUTE (R)	0 / 5	-	Reduce the line out noise.
78	Line out (R-CH)			
79	GND			GND FOR AUDIO
80	Line out (L-CH)			

14-13 Linear Audio

(1) Block Diagram

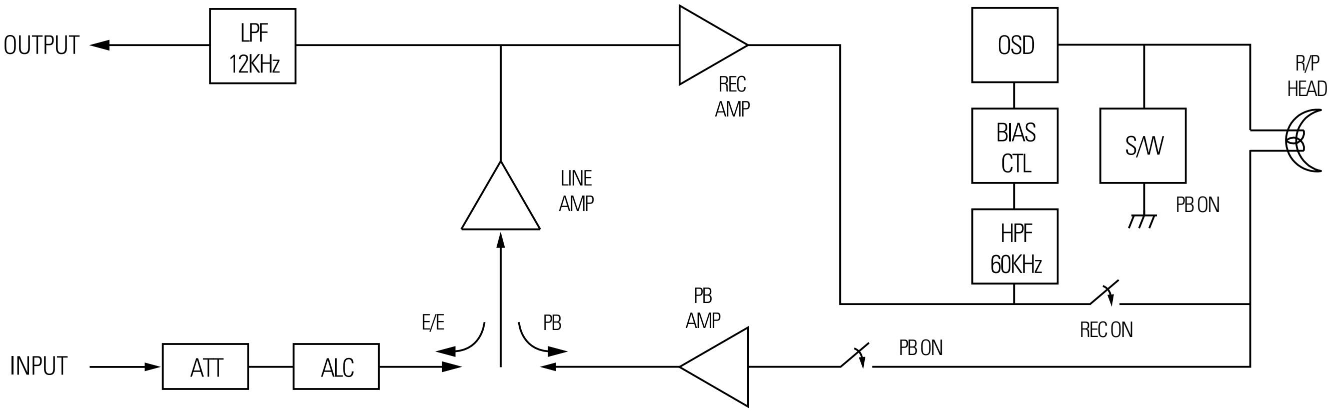


Fig. 14-27 Block Diagram

(2) Block Description

1) ATT (Attenuation)

Line amp is shared between PB mode and E/E mode, which reduces the recorded signal by 20dB and resister.

2) ALC (Auto Level Control)

If the signal level is lower than the reference signal (-6dBm) level, the output signal will equal the input signal. However, if the input signal is higher than the reference signal, the output will not equal the input and will gen erate uniform signal.

* ALC Application Purpose : Since linear audio is in AM (amplitude modulation) and uses magnetic recording device, it only records limited size and as the size of input signal increases, distortion increases. To prevent this occurance, mark sure the signal does not get bigger even if the level of distortion repodly increases.

3) LINE AMP

Line amp's gain is approximately 23dB. The purpose of the line amp is to amplify to 68dB in order to obtain the recorded signal on the tape during playback. As the amp gain increases, the passband decreases, which enables the amplification of low frequency. However, it is impossible to amplify frequency of 10KHz to 68dB with just 1 OPAMP. Therefore, to satisfy frequency and gain.

Line amp must be constructed into 2 steps of OP AMP. (gain is fixed within IC)

4) 12KHz LPF

There are various noises to signal output. The loudest noise is the “Video SYNC Frequency” of 15.734KHz

In order to eliminate the “Video SYNC Frequency”, “LPF” and “TRAP” are combined to “LPF”.

5) PB AMP

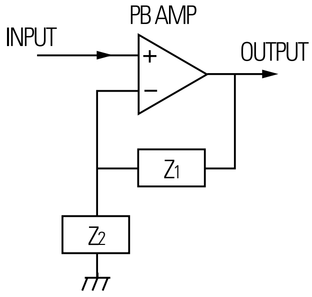


Fig. 14-28 PB Amp

The diagram to the left is the playback amp and the gain input/output are as follows.

$$Av = 1 + \frac{Z_1}{Z_2} \approx \frac{Z_1}{Z_2}$$

The playback characteristic of VHS format can be satisfied by using Z_1, Z_2 in the above equation.
PB amp gain should be designed to be approximately 45dB (1KHz).

6) REC AMP

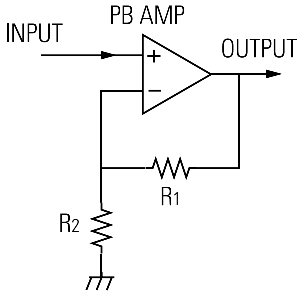


Fig. 14-29 REC Amp

The diagram to the left is REC AMP. The amp gain is approximately 14dB.
R_1 and R_2 that determine the gain is located inside the IC.
It is uniform and independent to frequency. Frequency characteristics should be considered when designing rec amp. The REC amp should be the opposite to playback characteristics.

7) OSC (Oscillation)

Oscillation frequency is 70KHz. It’s size is approximately 45Vp-p. it operates on recoed mode. It is supplied to audio erase head and full erase head used to erase already recorded signals.
Also, it conducts “AM (Amplitude Modulation)” using oscillation signals.

8) BIAS Control

Oscillation coil is used in oscillation Bias. Coil output changes according to the impedance of F/E, A/E and R/P head connected to the coil.

9) 60KHz HPF

There must be standard signal for bias control and that signal uses HPF only to obtain oscillation signal that comes through R/P head.

10) S/W

The switch opens when recording, shorts during playback and exterior transister is used.

(3) Pin Port Description (IC301 ; LA71207M)

PIN NO.	PIN NAME	DC VOLT.	SIGNAL	REMARK
9	REC OUT	2.3	-2dBm	REC AMP OUTPUT (GAIN ; 14dB)
75	GND	0	-	
6	BIAS	REC:2.3 PB:0	70KHz+1KHz MIX 3Vp-p	It is grounded due to the switch inside of IC during playback. During recording, it operates on 60KHz input HPF
11	BIAS CTL	REC:4.3V PB:5V	-	The BIAS CTL voltage change depends on the external TR.
6	PB EQ (+)	2.3	-	PB EQ AMP INPUT (+)
5	PB EQ (-)	2.3	-	PB EQ AMP INPUT (-)
7	PB EQ SW	2.3	-	PB EQ AMP SLP SW
3	PB EQ OUT	2.3	-32dBm	PB EQ AMP OUTPUT
2	LINE PB IN	2.3	-32dBm	LINE AMP INPUT (PB)
58	A.MUTE	0	-	Operates at HIGH (5V)
76	INPUT 1	2.3	-27dBm	AUDIO INPUT : -27dBm
78	INPUT 2	2.3	-27dBm	AUDIO INPUT : -27dBm
1	Vref Filter	2.3	-	
80	Input 3	2.3	-27dBm	AUDIO INPUT : -27dBm
77	Vcc	5.0	-	
10	Line Out	2.3	-4dBm	AUDIO OUTPUT : -4dBm
79	ALC IN	2.3	-13dBm	ALC level selector

14-14 TM

(1) Outline

RF and frequency synthesized tuning system

General description : The receiving circuit consists of both ANT input and output circuits, channel selection circuit, PIF circuit and SIF circuit. The receiving circuit selects a desired broadcast signal from TV signals induced on an antenna and sends stable video and audio signals to their respective processing circuits.

(2) Tuner modulator block

As explained, this model is designed in one package to contain a RF MODULATOR BLOCK, TUNER BLOCK AND IF DEMODULATOR BLOCK. Its size is greatly reduced and other noise interference can be minimized to make performance high.

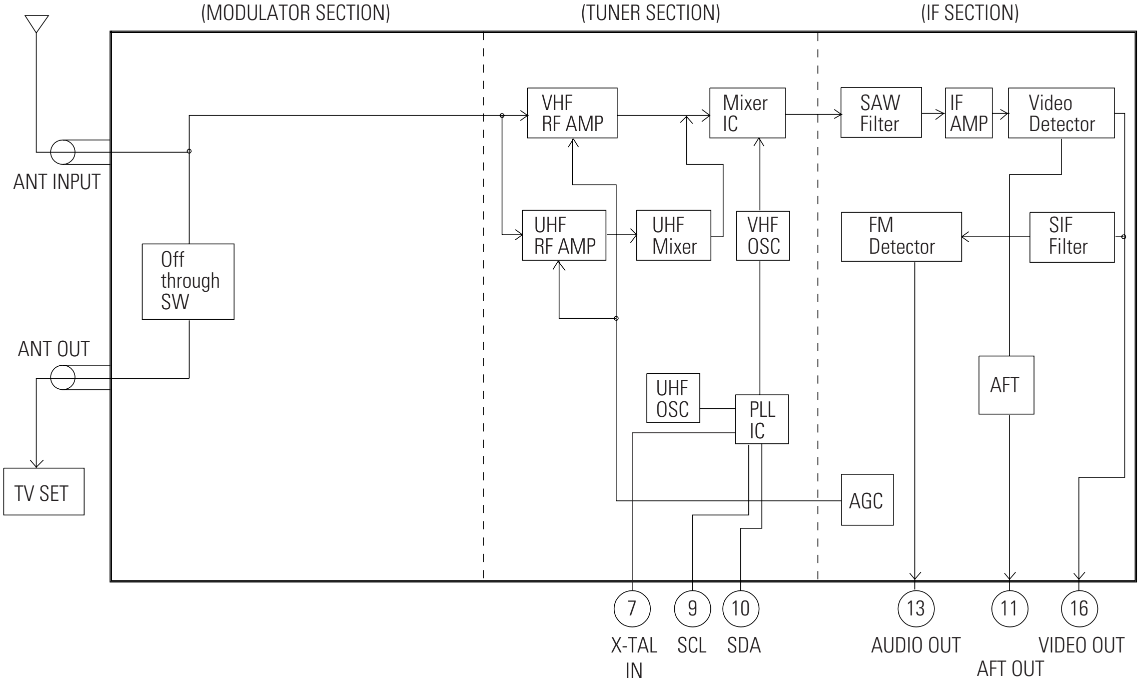

(MODULATOR SECTION)
(TUNER SECTION)
(IF SECTION)
ANT INPUT
ANT OUT
TV SET
Off through SW
VHF RF AMP
Mixer IC
UHF RF AMP
UHF Mixer
VHF OSC
UHF OSC
PLL IC
SAW Filter
IF AMP
Video Detector
FM Detector
SIF Filter
AFT
AGC
7
X-TAL IN
9
SCL
10
SDA
13
AUDIO OUT
11
AFT OUT
16
VIDEO OUT

Fig. 14-30 Tuner/demodulator Block Diagram

(3) Tuner Block

A. Low pass filter & high pass filter

This consists of IF trap circuit and UHF & VHF separation circuit. If the input signal is IF(45.75MHz), this filter prevents interference.

B. Single tune & RF AMP

This consists of a filter circuit, RF AMP, impedance conversion circuit, image trap and a single tuning circuit. It prevents noise and other interference signals. RF AMP is controlled by AGC come from IF DEMOD block.

C. Double tune

It consists of a double tuning circuit to improve rejection characteristic which results in a better band characteristic.

D. MOP IC (Mixer, OSC, PLL)

It consists a VHS and UHF OSC and mixer circuit. We applied a double balance mixer to have better rejection characteristic, it shows especially various beat characteristic.

It serects channels and contains charge pump band driver. The minimum step standard frequency 31.25KHZ.

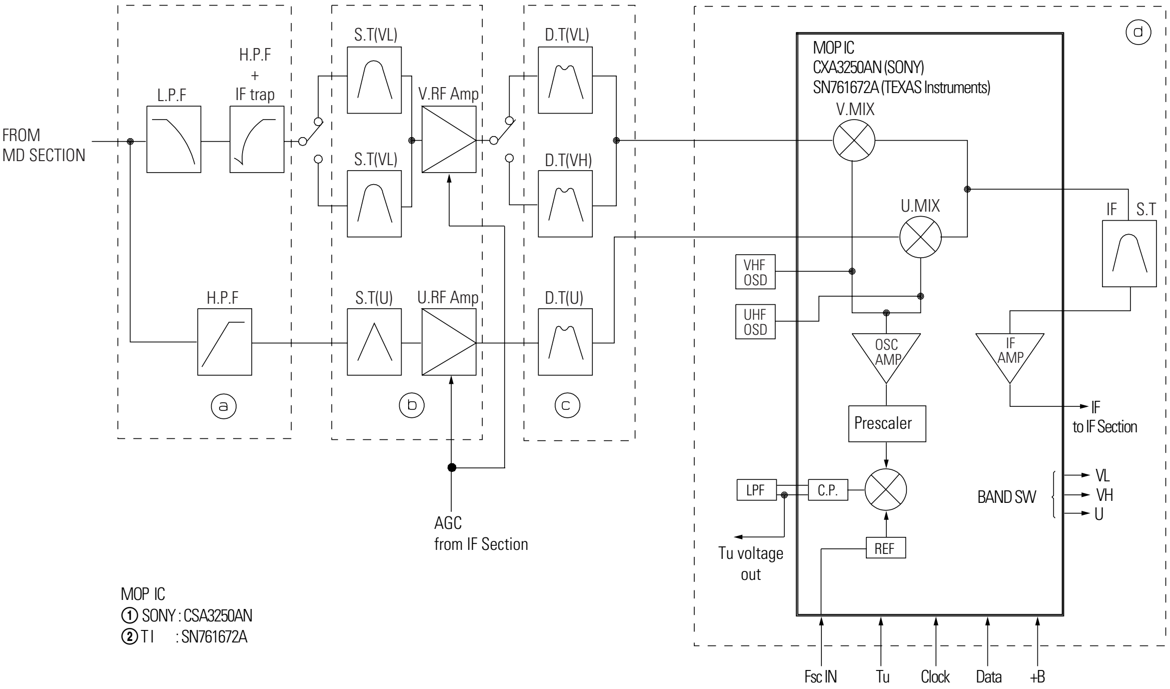

FROM
MD SECTION
L.P.F
H.P.F
+
IF trap
H.P.F
Ⓐ
S.T(VL)
V.RF Amp
S.T(VL)
S.T(U)
U.RF Amp
Ⓑ
D.T(VL)
D.T(VH)
D.T(U)
Ⓒ
AGC
from IF Section
MOP IC
① SONY : CSA3250AN
② T I : SN761672A
Ⓓ
MOP IC
CXA3250AN (SONY)
SN761672A (TEXAS Instruments)
V.MIX
U.MIX
IF S.T
VHF OSD
UHF OSD
OSC AMP
IF AMP
Prescaler
IF
to IF Section
LPF
C.P.
REF
BAND SW
VL
VH
U
Tu voltage
out
Fsc IN
Tu
Clock
Data
+B

Fig. 14-31 Tuner Section Block Diagram

(4) IF Block

A. SAW FILTER

It passes only needed band of the signal that is converted to IF frequency and decrease other band to minimize the effect of adjacent channel.

B. IF AMP

IF signal ,which is selected in SAW FILTER, is amplified in IF amp frequency enough to be detected. The IF AMP has parallel inputs & outputs structure and consists of 3 series step AMP.Each step has about 20dB gains.These gains are controlled by AGC voltage has maximum 63dB attenuation range.

C. RF AGC CONTROL

It is adjusted to determine RF AGC working point in tuner.

D. FM DETECTOR

After removing AM signal in the limiter AMP ,amplified SIF signal is applied FM detector. This FM detector is PLL detecting type.

E. AFT DETECTER

AFT automatically controls the OSC frequency in the tuner, so that it retains a constant level.
It is a quadrature detection type. The carrier, which is detected from video det is directly input to AFT detector .
The 90 degree delayed phase signal is input at the same time to AFT detector and ,the results come out.
Detected AFT voltage is amplified by DC AMP and then applied to pin 13.

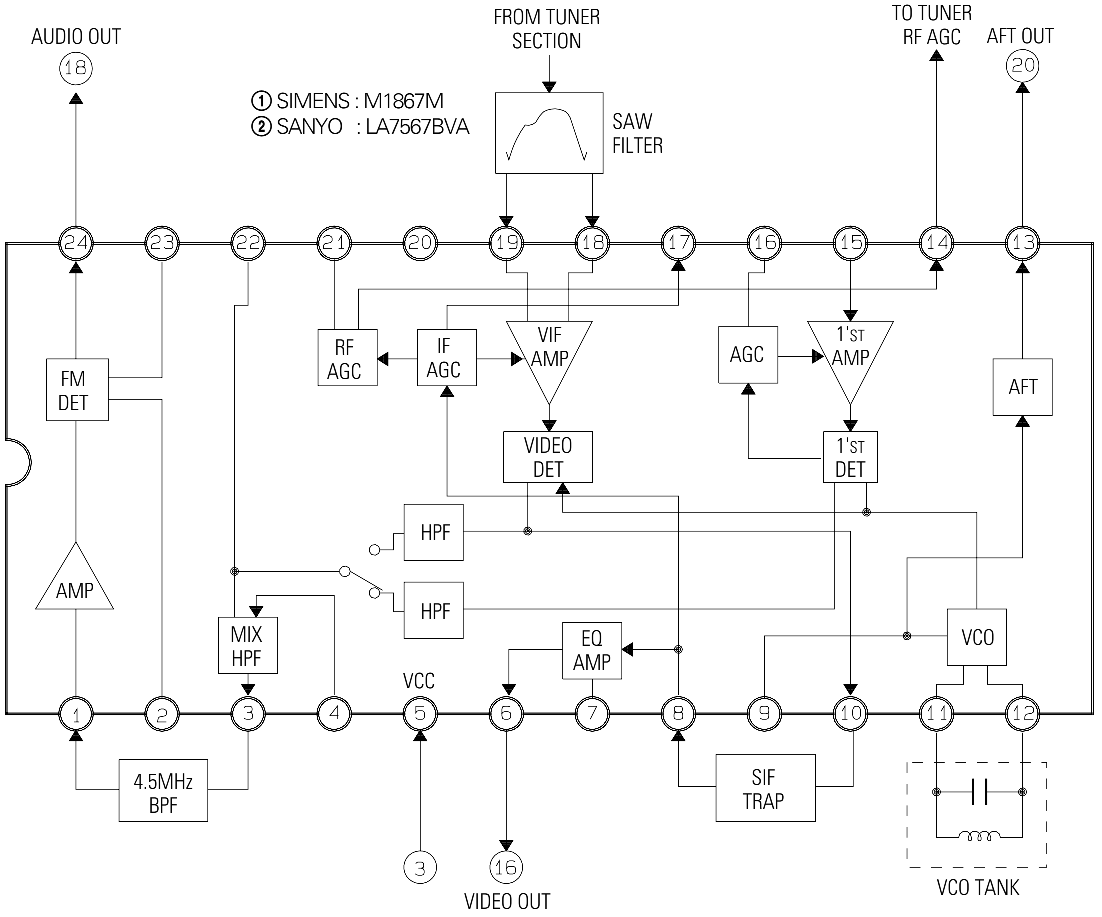

AUDIO OUT
18
FROM TUNER SECTION
TO TUNER RF AGC
AFT OUT
20
① SIMENS : M1867M
② SANYO : LA7567BVA
SAW FILTER
24
23
22
21
20
19
18
17
16
15
14
13
FM DET
RF AGC
IF AGC
VIF AMP
AGC
1'ST AMP
AFT
VIDEO DET
1'ST DET
HPF
HPF
AMP
MIX HPF
EQ AMP
VCO
VCC
1
2
3
4
5
6
7
8
9
10
11
12
4.5MHz BPF
SIF TRAP
3
16
VIDEO OUT
VCO TANK

Fig. 14-32 IF Ssection Block Diagram

14-15 OSD

The on screen display circuit consist of a character generator decoder, video mixer, sync separator and sync generator, sync detector circuit.
The data is decoded and generates characters in syncro with composite video signal applied pin 49, 50.
Also the sync detector circuit discriminates the presence of a video signal by detecting sync, if no sync is detected, a blue screen is displayed. In other word, the OSD circuit displays character on the video when there is a video signal or on blue screen when there is no video signal. (No sync).

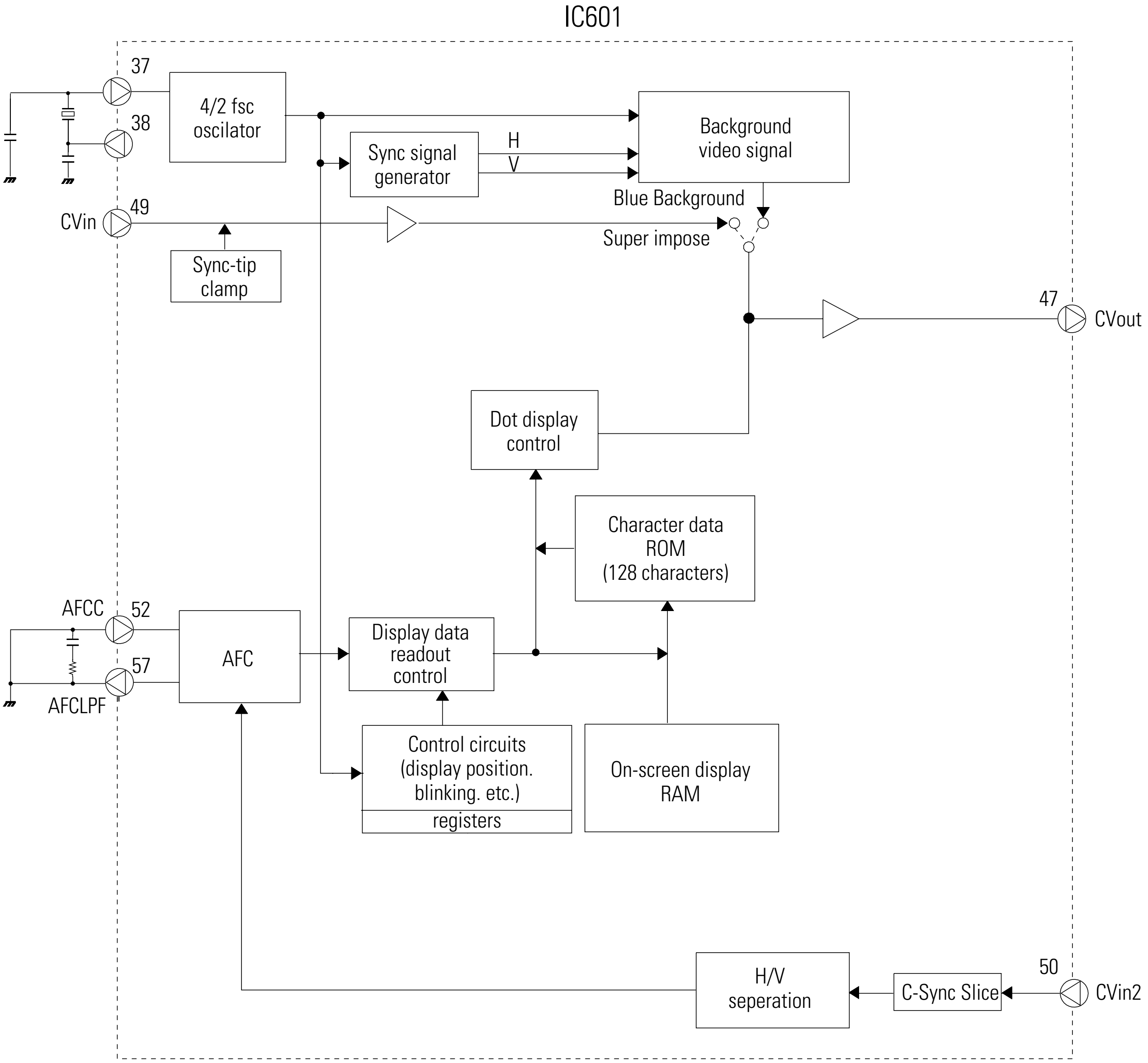

IC601
37
38
4/2 fsc oscilator
Sync signal generator
H
V
Background video signal
Blue Background
Super impose
49
CVin
Sync-tip clamp
47
CVout
Dot display control
Character data ROM (128 characters)
AFCC
52
57
AFCLPF
AFC
Display data readout control
Control circuits (display position. blinking. etc.)
registers
On-screen display RAM
H/V seperation
C-Sync Slice
50
CVin2

Fig. 14-33 Block Diagram

MEMO

15. Reference Information

15-1 VCR Deck Operating Description

15-1-1 Features of Mechanism

The following items describe features of the mechanism in VCR.

(1) This VCR uses 3-motor system consisted of a cylinder motor, capstan motor, and loading motor.
A capstan motor is used to drive the reel and the driving force is transmitted throuch the belt capstan.
The cassette loading, tape loading, and mode shift operation are performed by the loading motor.

(2) The time duration from cassette-in to picture appearance is shortened by employing the loading drive mechanism (automatic transferring operation from the cassette loading to the tape loading by rotating the loading motor continuously), and by increasing the speed of the tape loading, etc

(3) Employment of the full loading system shortens time required to shift the mode such as STOP to PLAY-BACK picture display.

(4) To simplify wiring and others, the electrical components relating to operation of the mechanical deck, such as sensors, mode switch, servo microcomputer, etc. are mounted on the PCB arranged all over the bottom side of the mechanical deck.

15-2 Basic Configuration of Mechanism

As shown in Fig. 15-1, the mechanism of VCR is configured with five main blocks, and each operation is precisely controlled by the microcomputer built in the system control section.

First, load a video cassette tape in VCR :

(1) The cassette is automatically set on the reel disc.

(2) The tape is pulled out from the cassette, and wrapped around the cylinder.

(3) The cylinder turns in a constant speed rate synchronizing with the vertical Sync. signal of video signal.

(4) The tape runs in synchronization with cylinder rotation and traces the video tracks precisely.

(5) The running tape is taken up by the reel, the tape feeding side is given with a proper tension so that tape is not slacked.

The above series of operations are performed under control of the system control section. The system control section also sends commands to each mechanism according to the operation buttons, thus the VCR is designed so that various operations such as recording, playback, special playback, FPS/RPS, and FF/REW, etc. are correctly performed.

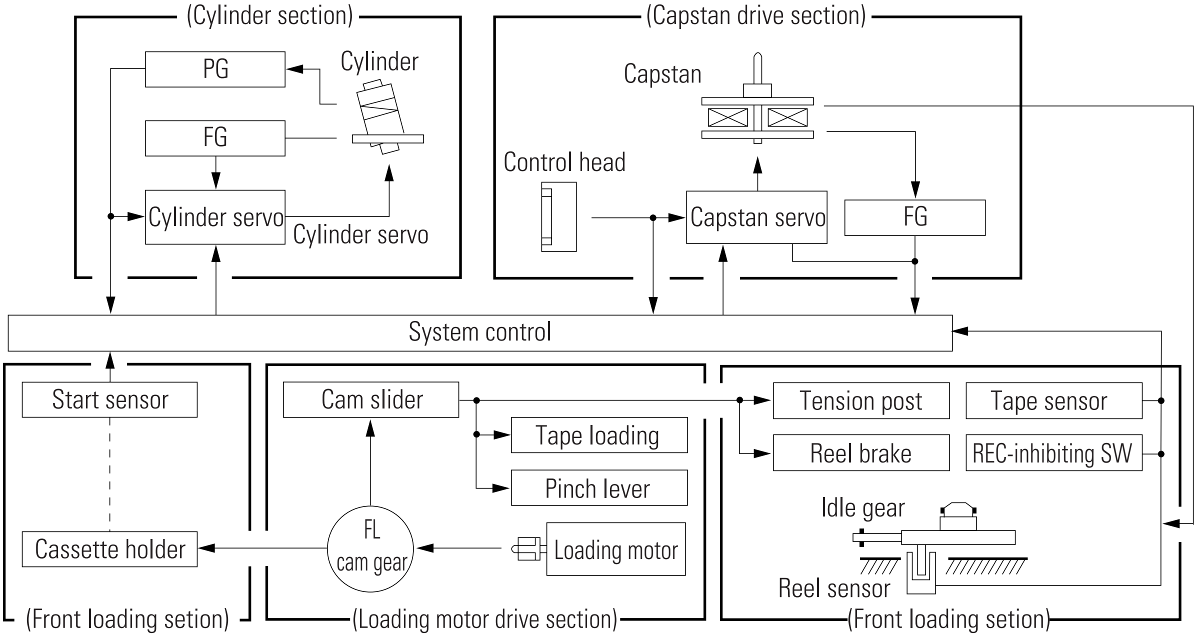

(Cylinder section)
PG
Cylinder
FG
Cylinder servo
Cylinder servo
(Capstan drive section)
Capstan
Control head
Capstan servo
FG
System control
Start sensor
Cassette holder
(Front loading setion)
Cam slider
Tape loading
Pinch lever
FL
cam gear
Loading motor
(Loading motor drive section)
Tension post
Tape sensor
Reel brake
REC-inhibiting SW
Idle gear
Reel sensor
(Front loading setion)

Fig. 15-1 Basic Configuration of Mechanism

15-3 Main Mechanism and Functions

15-3-1 Tape Path System

The tape come out from the supply reel (S) of the video cassette runs through paths shown in Figs. 15-2 and 15-3, and is taken up by the take-up (T) reel. (S stands for the supply reel, and T for the take-up reel, hereafter.)
At S reel side (tape enterance side of the cylinder) against the cylinder, a tension post to allow the tape surface to contact with each head with a proper tension which assures stable running, an FE head which erases entire data of the tape, and an S guide roller which restricts tape motion in upward/downward direction are provided.
In the same way, a T guide roller, audio head to record audio signals at upper side of the tape, control head to record and reproduce a control signal at lower side of the tape, and an audio erase head to erase only the audio signals and perform after-recording in parallel with the audio head are provided at T reel side. (tape exit side of the cylinder).
The guide parts marked with asterisks (*) are equipped with the adjusting mechanism to stabilize the tape running or to record and reproduce the signals precisely.

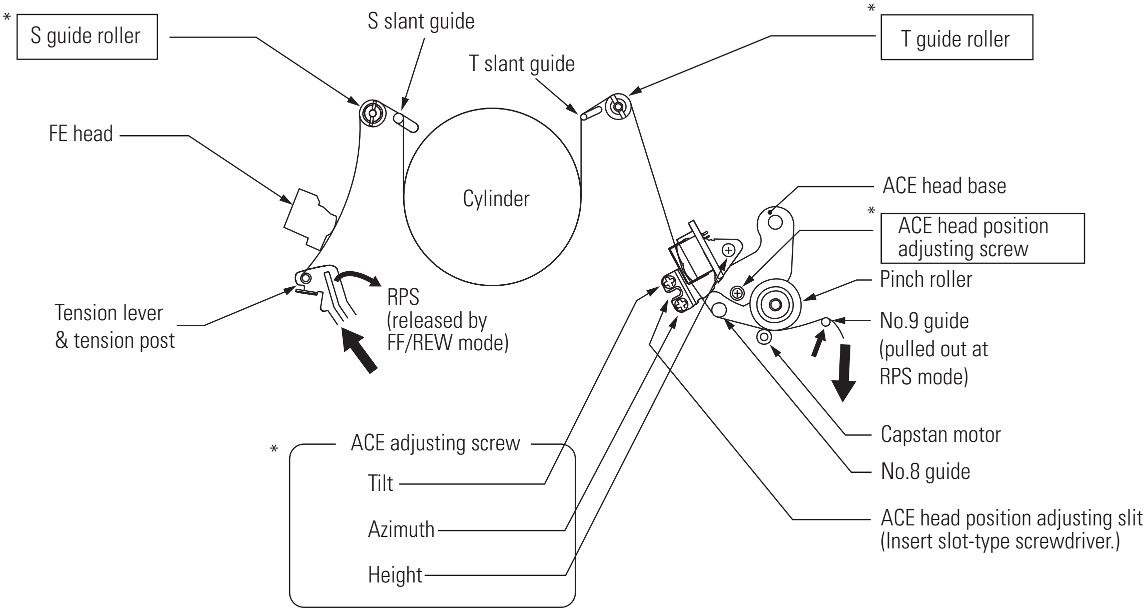

* S guide roller
S slant guide
T slant guide
* T guide roller
FE head
Cylinder
ACE head base
* ACE head position adjusting screw
Pinch roller
Tension lever & tension post
RPS (released by FF/REW mode)
No.9 guide (pulled out at RPS mode)
Capstan motor
* ACE adjusting screw
Tilt
Azimuth
Height
No.8 guide
ACE head position adjusting slit (Insert slot-type screwdriver.)

Fig. 15-2 Tape Path System

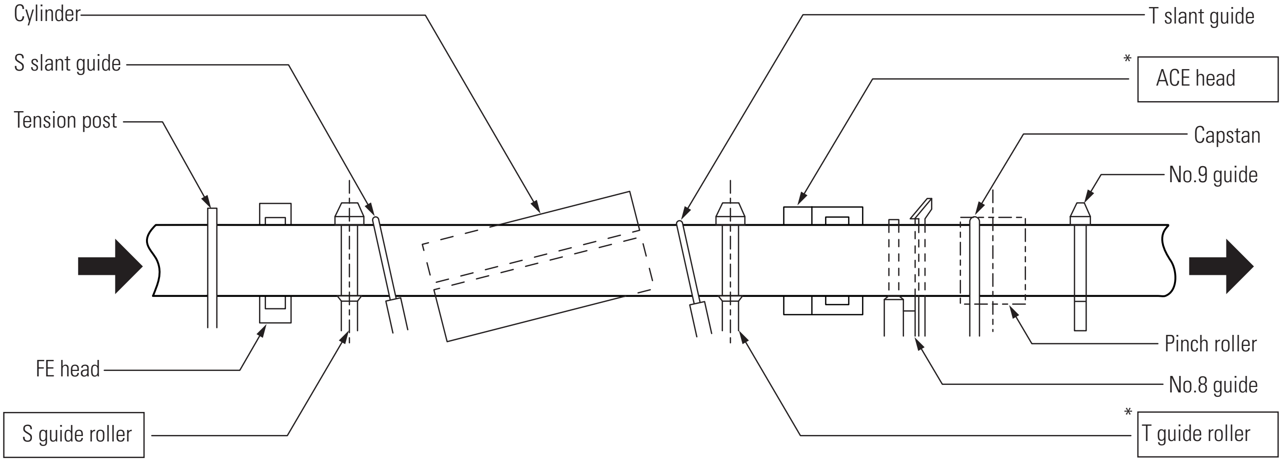

Cylinder
S slant guide
Tension post
FE head
* S guide roller
T slant guide
* ACE head
Capstan
No.9 guide
Pinch roller
No.8 guide
* T guide roller
* show the locations to be adjusted.

Fig. 15-3 Guide Path System

15-3-2 Reel Drive System

The reel drive system consists of a capstan motor as a drive power source, belt as a power transmission mechanism, clutch mechanism, idle gears, and a reel disc. Selecting of forward rotation or reverse rotation is carried out by an idle gear which changes its rotating direction according to rotating direction of the clutch holder.
Reel take-up torque is selected according to an operation mode.
In the record, playback, fps, rps modes, the reel take-up torque is controlled by the clutch mechanism, thereby the tape fed by the capstan is taken up with a proper torque.
In the FF and REW modes, the clutch enters a direct connecting status in which the clutch mechanism does not operate and the capstan drive torque is transmitted without reduction, so a high speed taking-up is enabled.

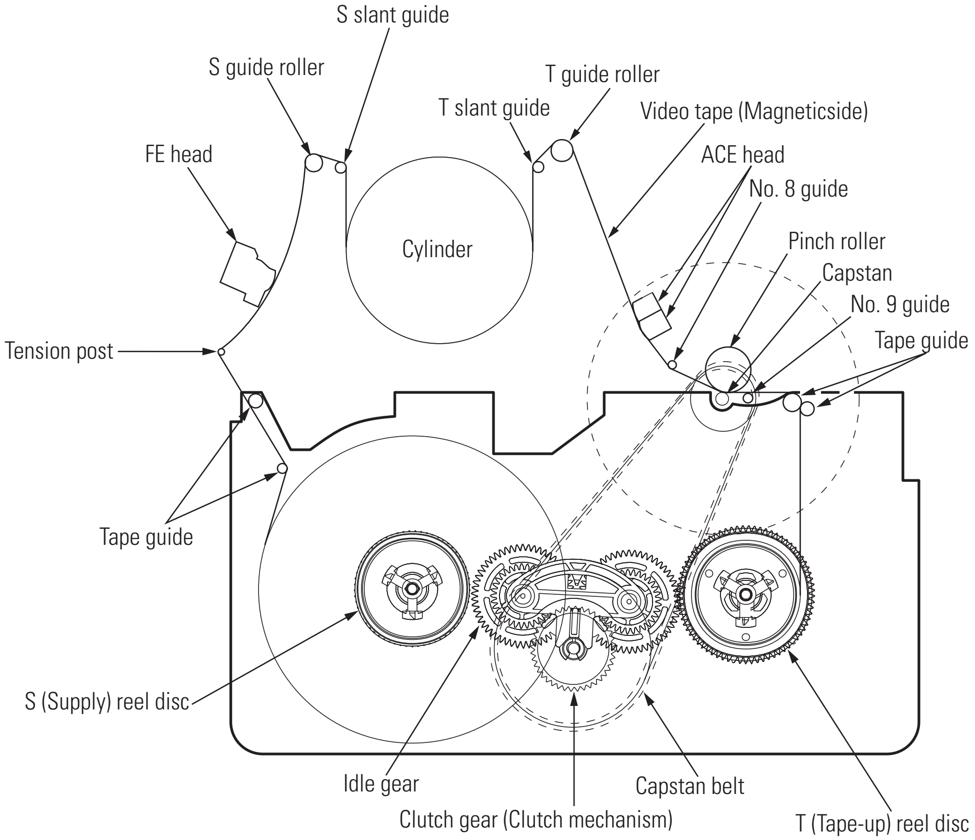

S slant guide
S guide roller
T guide roller
T slant guide
Video tape (Magneticside)
FE head
ACE head
No. 8 guide
Cylinder
Pinch roller
Capstan
No. 9 guide
Tape guide
Tension post
Tape guide
S (Supply) reel disc
Idle gear
Capstan belt
Clutch gear (Clutch mechanism)
T (Tape-up) reel disc

Fig. 15-4 Reel Drive System

15-4 Basis of the Mechanism

15-4-1 Front Loading

(1) When a video cassette is inserted into the cassette holder and pushed furthermore, FL arm lever is rotated by motion of the cassette holder. The rotation of FL arm lever makes the horizontal moving of FL drive slider.

(2) When the information of Start Sensor OFF is transmitted to the microcomputer, the loading motor starts to rotate.

(3) The rotation is transmitted in a sequence shown below :
Loading motor - worm gear - worm wheel -
FL Cam Gear - FL Drive Slider - FL Arm Lever -
Cassette Holder

(4) The video cassette is horizontally moved.

(5) The cassette tape is vertically moved.
In this case, the cassette lid is opened.

(6) The cassette tape is set on the reel disc, and loading operation completes.

(7) The cassette tape is loaded.

(8) The status becomes full loading.

(9) When the cassette is out, the reverse steps of the above procedure are carried out.

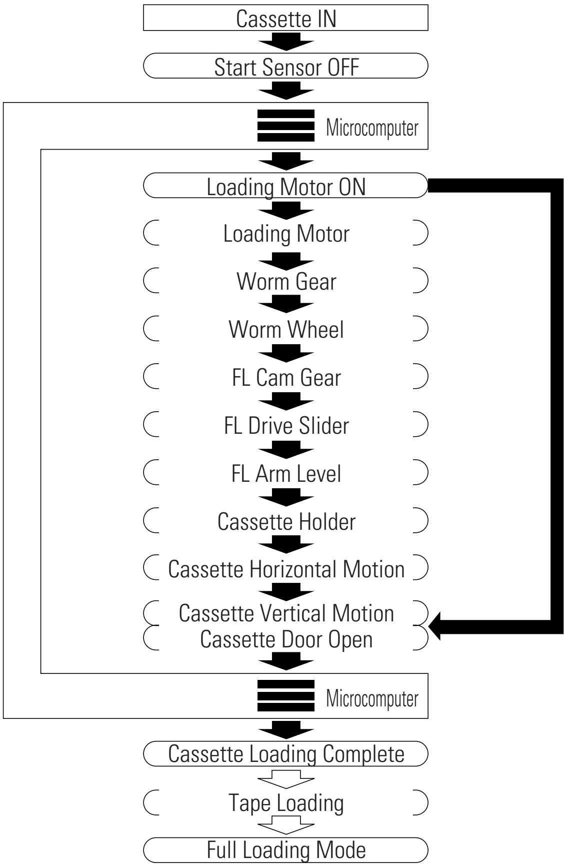

Cassette IN
Start Sensor OFF
Microcomputer
Loading Motor ON
Loading Motor
Worm Gear
Worm Wheel
FL Cam Gear
FL Drive Slider
FL Arm Level
Cassette Holder
Cassette Horizontal Motion
Cassette Vertical Motion
Cassette Door Open
Microcomputer
Cassette Loading Complete
Tape Loading
Full Loading Mode

Fig. 15-5

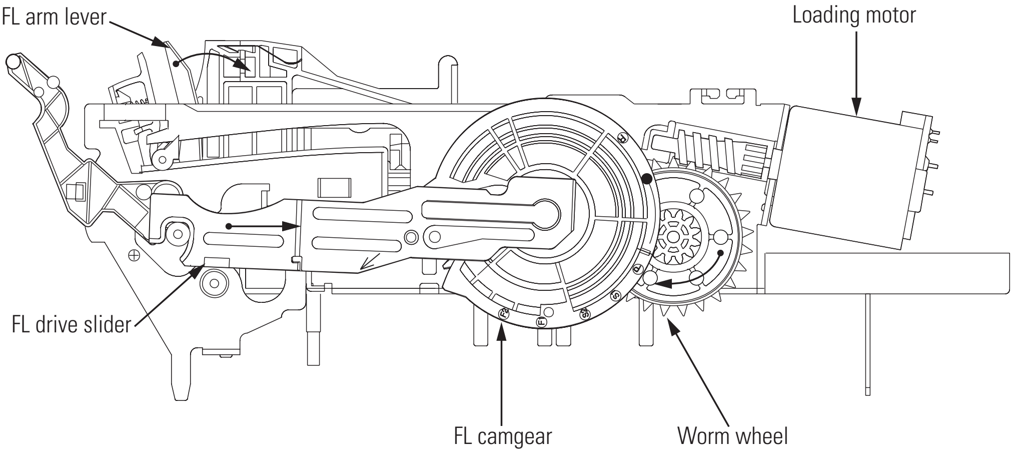

FL arm lever
Loading motor
FL drive slider
FL camgear
Worm wheel

Fig. 15-6 Drive Transmission Path

15-4-2 Cassette loading/unloading Modes

When a cassette is entered in the VCR, the cassette is set on the reel disc by the front loading mechanism.
In this case, the tension post, loading tape guide, capstan motor, and the No.9 guide are positioned inside of the tape in the cassette case.

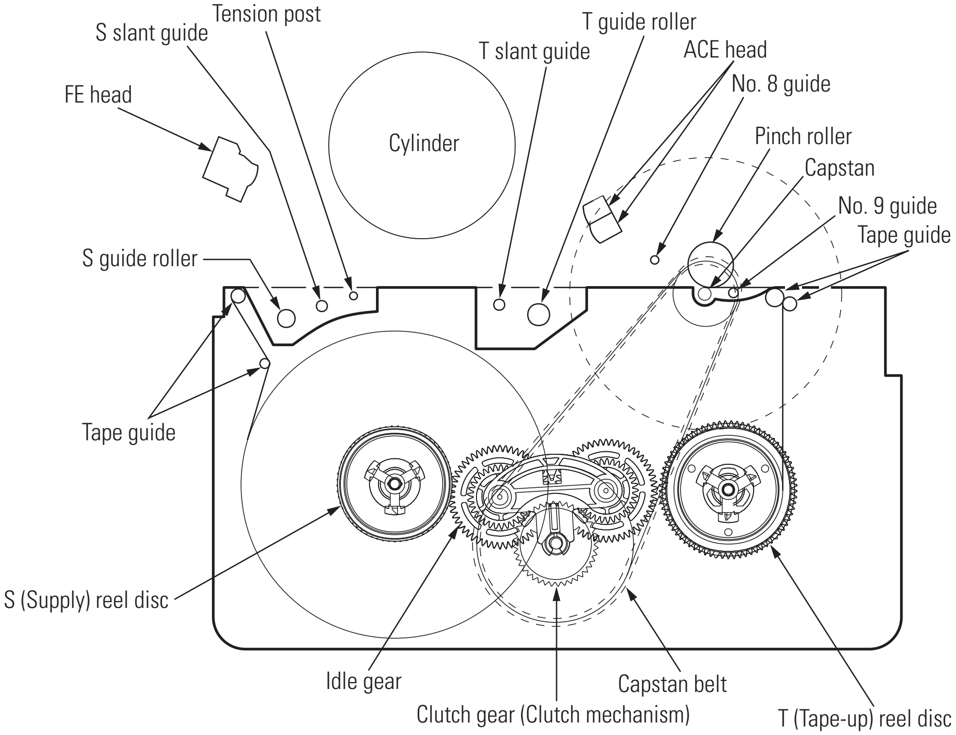

S slant guide
Tension post
FE head
Cylinder
T slant guide
T guide roller
ACE head
No. 8 guide
Pinch roller
Capstan
No. 9 guide
Tape guide
S guide roller
Tape guide
S (Supply) reel disc
Idle gear
Clutch gear (Clutch mechanism)
Capstan belt
T (Tape-up) reel disc

Fig. 15-7 Cassette IN/OUT Mode

15-4-3 Tape Loading

A full loading system is employed.
In the full loading system, the tape loading starts at the same time when the cassette loading operation has completed and cassette has been mounted, and the tape is pulled out, wrapped around the cylinder and the mechanism enters the stop status under this condition.

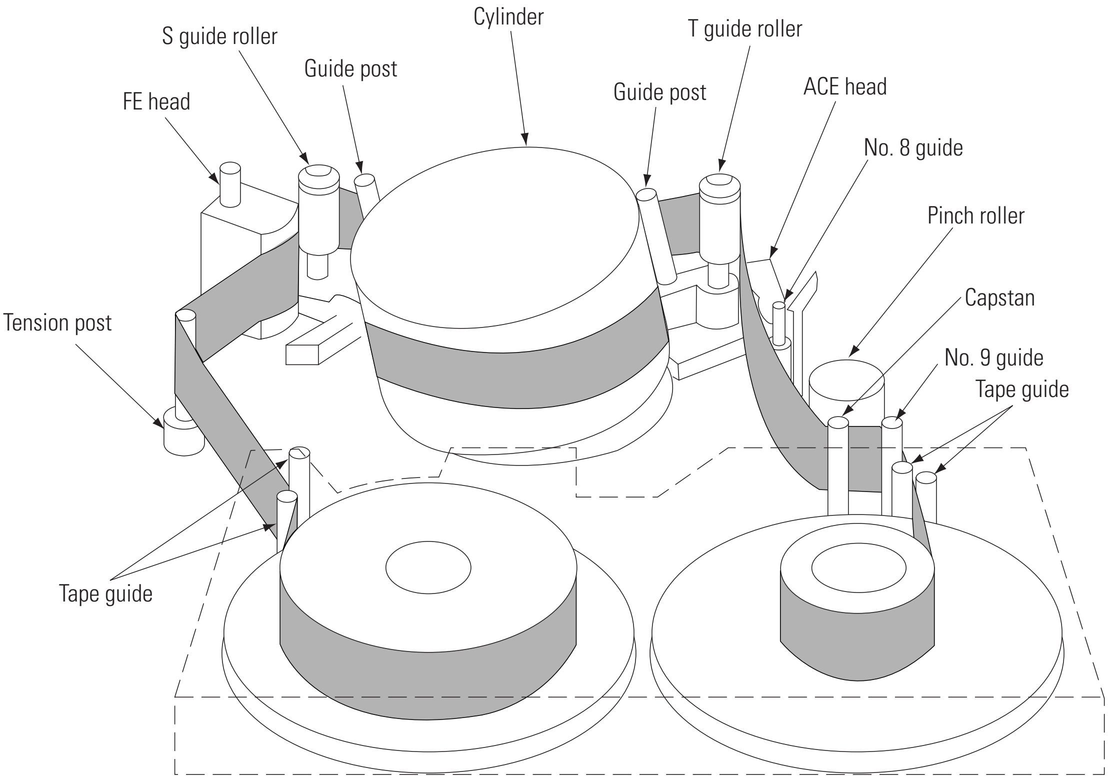

Cylinder
S guide roller
T guide roller
Guide post
Guide post
ACE head
FE head
No. 8 guide
Pinch roller
Capstan
Tension post
No. 9 guide
Tape guide
Tape guide

Fig. 15-8 Tape Loading

15-4-4 Playback Standby Mode

In the full loading system, the tape loading starts at the same time when the cassette mounting has completed, the mechanism shifts to the playback position, and enters the standby status with keeping tape wrapped around the cylinder.
In this case, tape tension applied to the cylinder is decreased to protect the tape and to prevent the tape from scratches.

15-4-5 FF/REW Modes

The reels enter a free status by rotating the loading motor to go to FF/REW position.
In this case, the capstan motor rotates in colck-wise direction in the REW mode. The idle gear is swung rightward or leftward according to the rotating direction of the capstan motor. As a result, the T reel rotates in the FF mode or the S reel rotates in the REW mode, thus taking up the tape to the rotating reel.

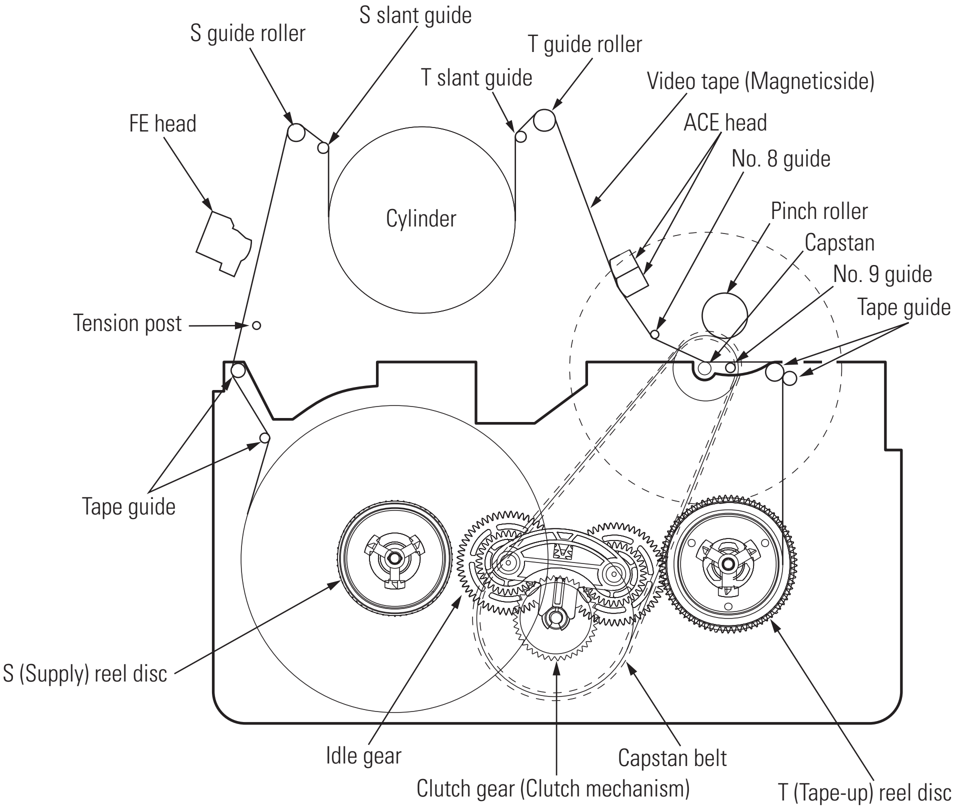

S guide roller
S slant guide
T guide roller
T slant guide
Video tape (Magneticside)
FE head
ACE head
No. 8 guide
Cylinder
Pinch roller
Capstan
No. 9 guide
Tape guide
Tension post
Tape guide
S (Supply) reel disc
Idle gear
Capstan belt
Clutch gear (Clutch mechanism)
T (Tape-up) reel disc

Fig. 15-9 FF/REW Mode

15-4-6 Record/Playback Modes

When the record or playback button is pressed, the tape is fed by the rotation of the capstan motor.
In this case, a tension post touches the tape and braking froces created by the band brake linked with the tension post is applied to the S reel, thereby stabilizing the tape tension. The tape fed by the capstan is taken up around the T reel. The T reel is driven with a constant torque generated by transmitting rotation of the capstan motor to the clutch mechanism.

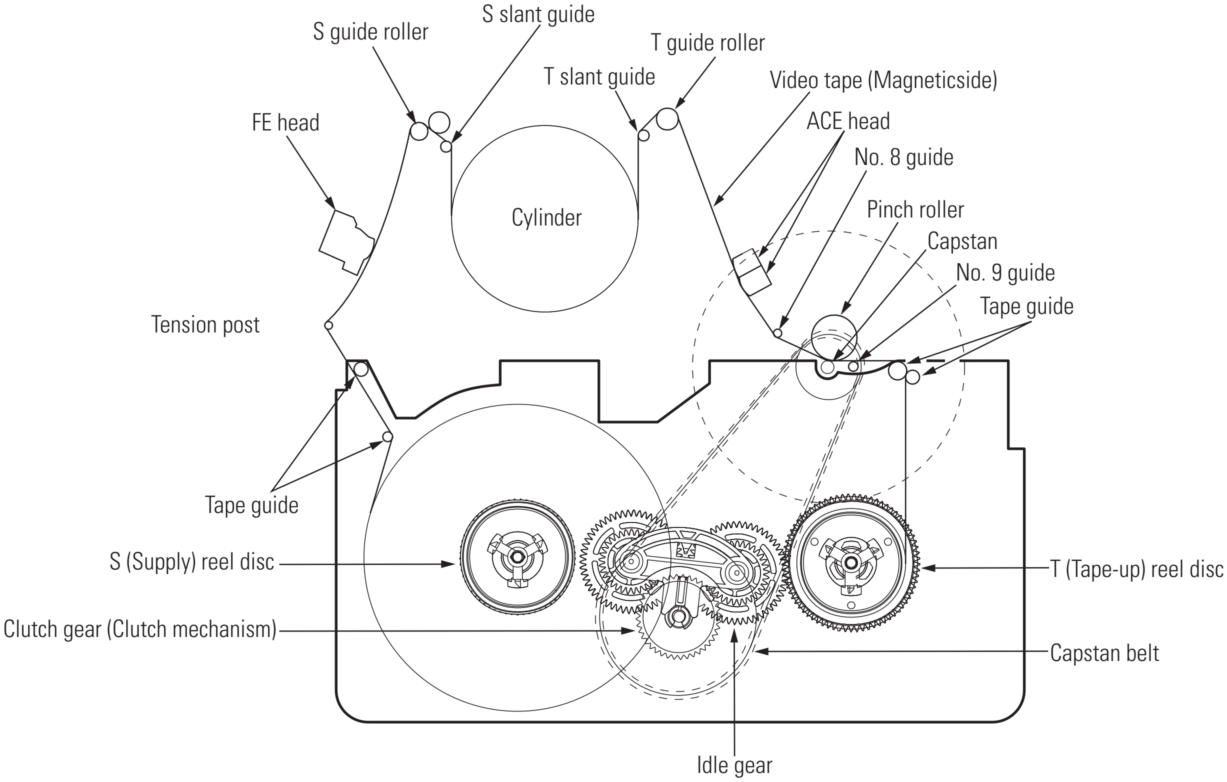
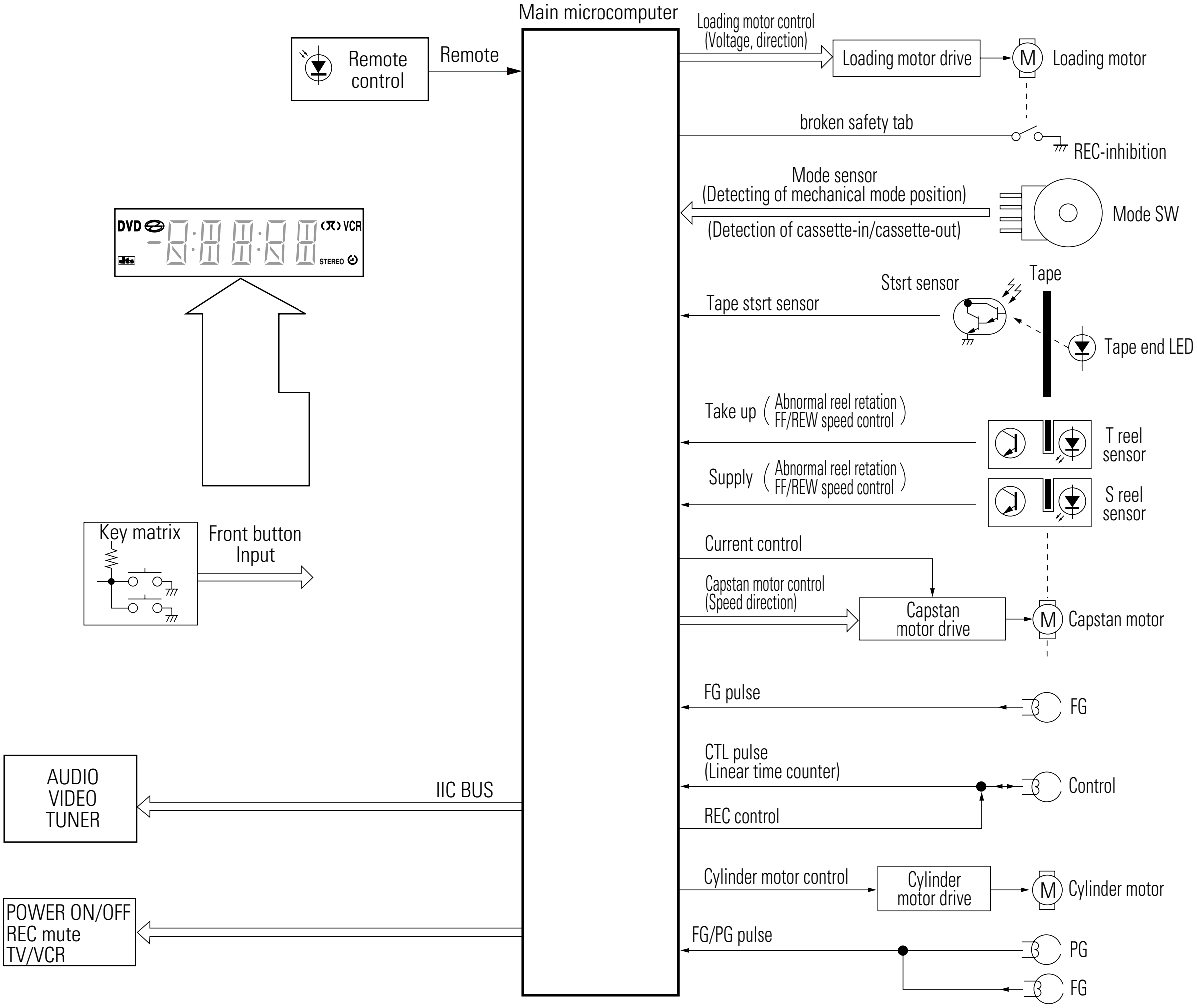

S slant guide
S guide roller
T guide roller
T slant guide
Video tape (Magneticside)
FE head
ACE head
No. 8 guide
Cylinder
Pinch roller
Capstan
No. 9 guide
Tape guide
Tension post
Tape guide
S (Supply) reel disc
T (Tape-up) reel disc
Clutch gear (Clutch mechanism)
Capstan belt
Idle gear

Fig. 15-10 Record/Playback Mode

15-5 System Control

In the VCR, complex mechanism, video, audio, servo circuits, etc. must be operated in specified timings matched each other. The system control circuit performs entire controls for the VCR.
An automatic stop function is also provided to protect important tape if a trouble occurs on the complex mechanism and the electrical circuits.
For this purpose, status of each part of the mechanism is always monitored with various sensor switches, and the microcomputer controls collectively the unit so that the best condition is kept.
Moreover, the microcomputer controls signal switchings for each circuit according to the mechanism status.



Main microcomputer
Remote control
Remote
Loading motor control (Voltage, direction)
Loading motor drive
M
Loading motor
broken safety tab
REC-inhibition
Mode sensor (Detecting of mechanical mode position)
(Detection of cassette-in/cassette-out)
Mode SW
DVD
VCR
STEREO
Stsrt sensor
Tape
Tape stsrt sensor
Tape end LED
Take up (Abnormal reel retation FF/REW speed control)
T reel sensor
Supply (Abnormal reel retation FF/REW speed control)
S reel sensor
Key matrix
Front button Input
Current control
Capstan motor control (Speed direction)
Capstan motor drive
M
Capstan motor
FG pulse
FG
CTL pulse (Linear time counter)
Control
IIC BUS
AUDIO VIDEO TUNER
REC control
Cylinder motor control
Cylinder motor drive
M
Cylinder motor
POWER ON/OFF
REC mute
TV/VCR
FG/PG pulse
PG
FG

Fig. 15-11 System Control Block Diagram

15-6 System Control and Mechanical Operations

15-6-1 Mechanical Operation

The operation of mechanism is performed by rotation of the loading motor, and the transmission path of the operation is as shown in Fig. 15-12.

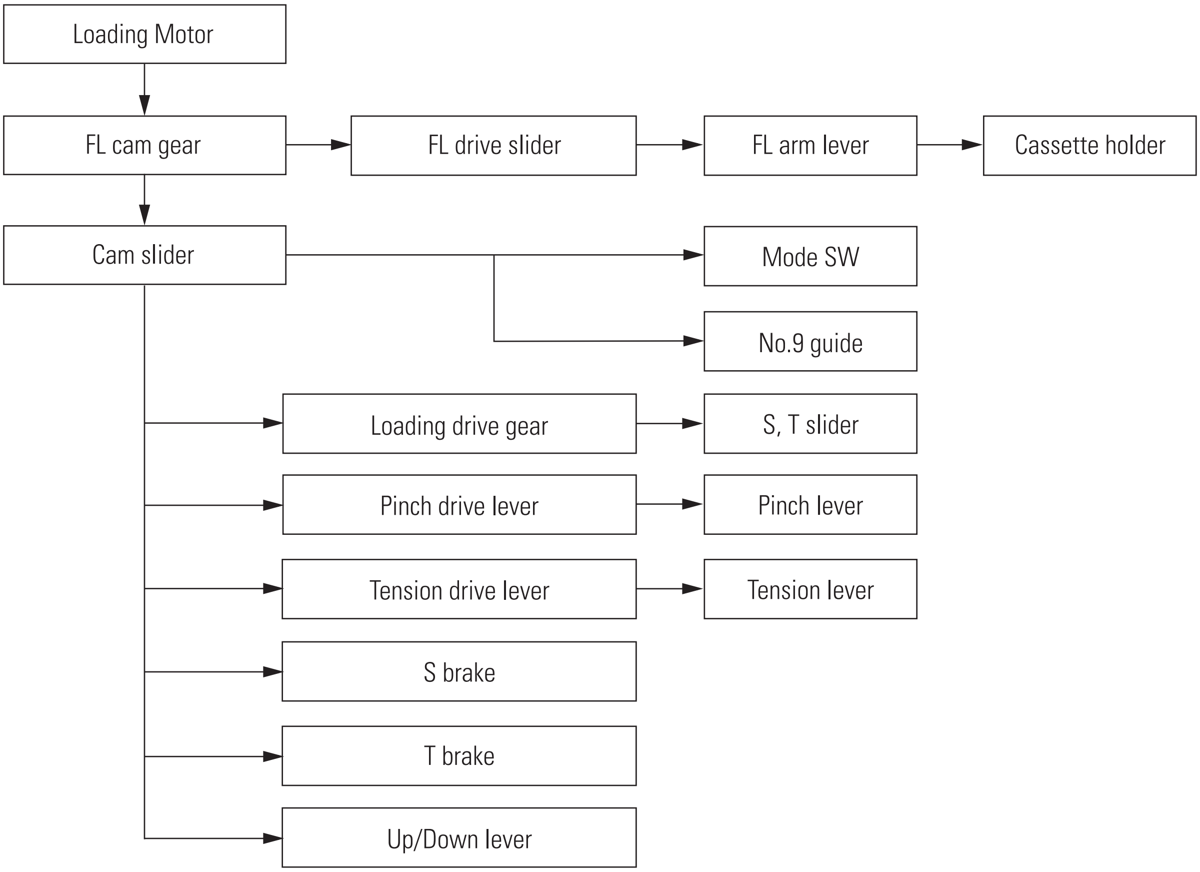
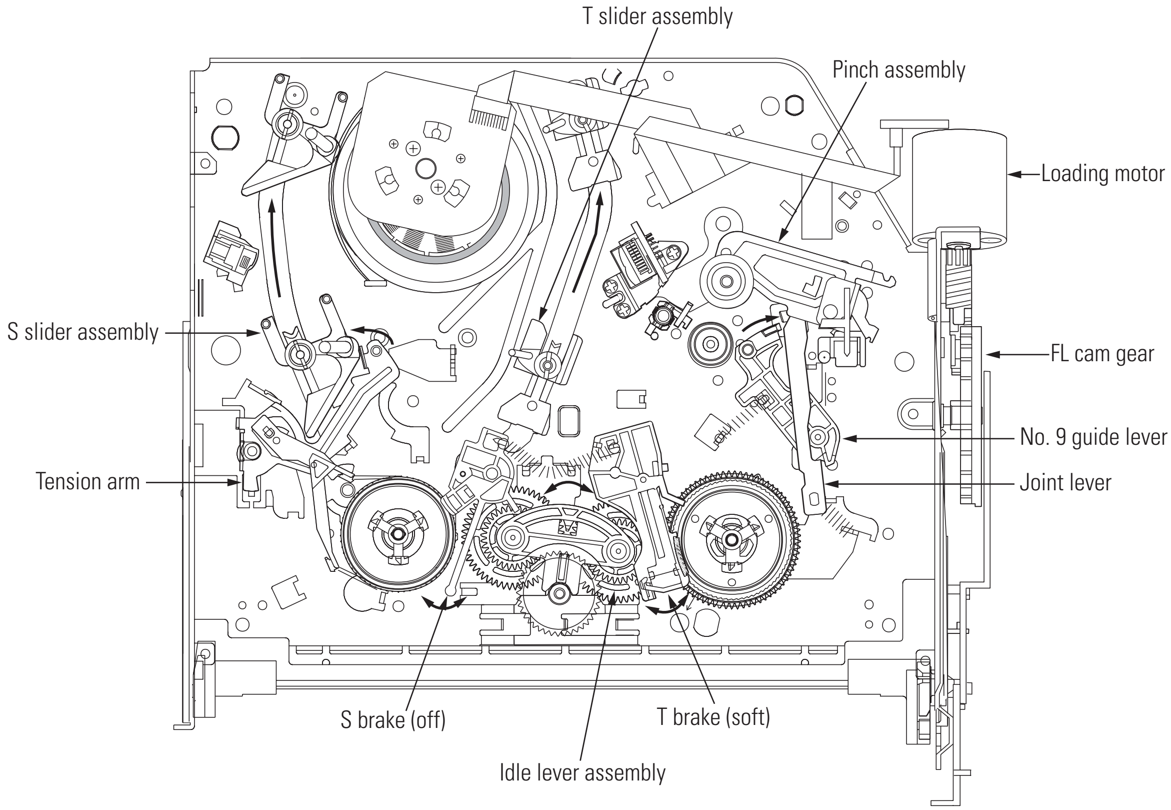

Loading Motor
FL cam gear
FL drive slider
FL arm lever
Cassette holder
Cam slider
Mode SW
No.9 guide
Loading drive gear
S, T slider
Pinch drive lever
Pinch lever
Tension drive lever
Tension lever
S brake
T brake
Up/Down lever

Fig. 15-12 Transmission Path of Operation

Fig. 15-14 shows each mode and mechanism status in each mode concerned with the rotation of the FL cam gear or cam slider shift. The mechanism operates as shown in Fig. 15-13 according to the timing chart in Fig. 15-14.

Note :
The Start Sensor is actuated by the horizontal moving of Slider FL Drive and turned on or off by insertion or ejection of a cassette.

<Top View>


T slider assembly
Pinch assembly
Loading motor
S slider assembly
FL cam gear
No. 9 guide lever
Tension arm
Joint lever
S brake (off)
T brake (soft)
Idle lever assembly

<Bottom View>

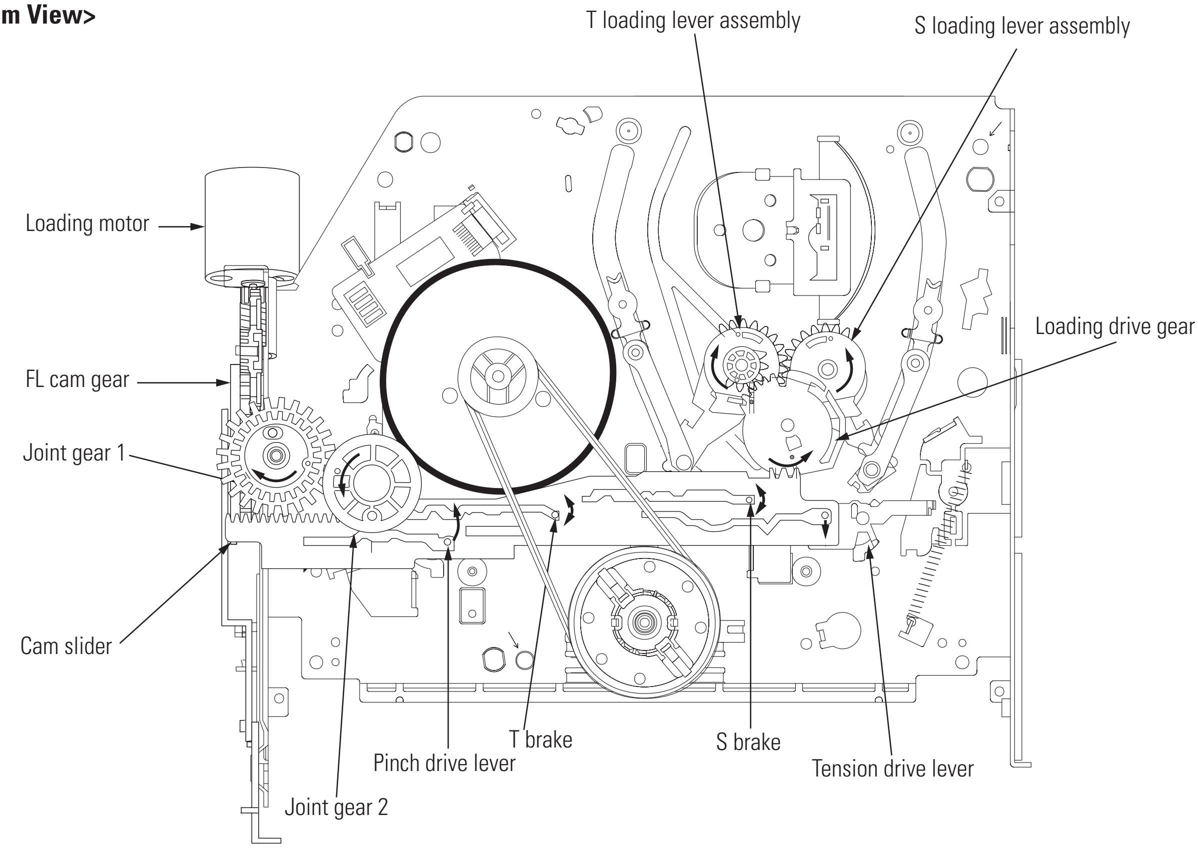

T loading lever assembly
S loading lever assembly
Loading motor
Loading drive gear
FL cam gear
Joint gear 1
Cam slider
T brake
S brake
Pinch drive lever
Tension drive lever
Joint gear 2

Fig. 15-13 Mechanical Operation

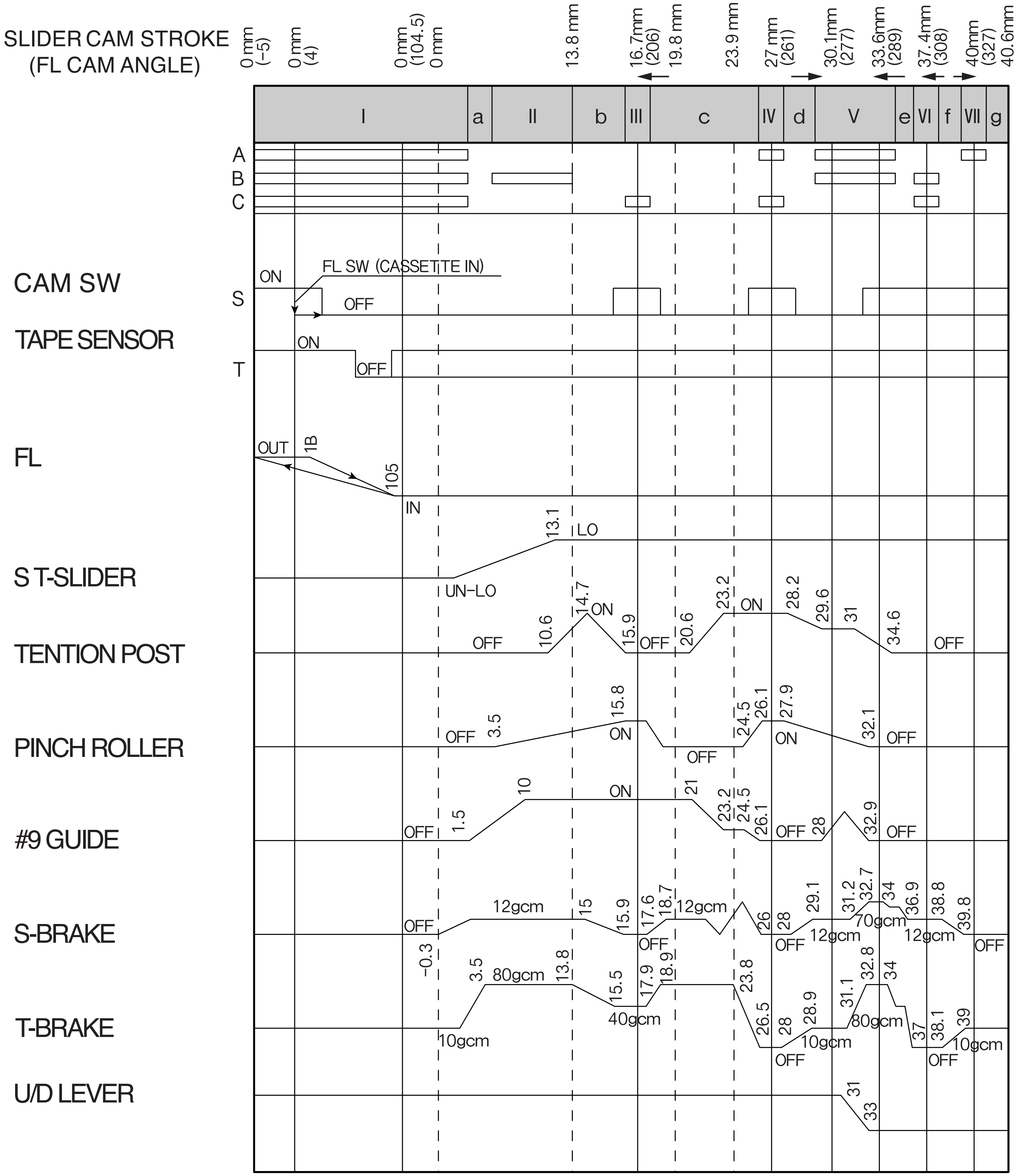

SLIDER CAM STROKE
(FL CAM ANGLE)
0 mm (−5)
0 mm (4)
0 mm (104.5) 0 mm
13.8 mm
16.7mm (206)
19.8 mm
23.9 mm
27 mm (261)
30.1mm (277)
33.6mm (289)
37.4mm (308)
40mm (327)
40.6mm
I
a
II
b
III
c
IV
d
V
e
VI
f
VII
g
A
B
C
CAM SW
S
ON
FL SW (CASSETTE IN)
OFF
TAPE SENSOR
T
ON
OFF
FL
OUT
1B
105
IN
S T-SLIDER
13.1
LO
UN-LO
TENTION POST
OFF
10.6
14.7
ON
15.9
OFF
20.6
23.2
ON
28.2
29.6
31
34.6
OFF
PINCH ROLLER
OFF
3.5
15.8
ON
OFF
24.5
26.1
27.9
ON
32.1
OFF
#9 GUIDE
OFF
1.5
10
ON
21
23.2
24.5
26.1
OFF
28
32.9
OFF
S-BRAKE
OFF
12gcm
15
15.9
17.6
18.7
OFF
12gcm
26
28
OFF
29.1
12gcm
31.2
32.7
70gcm
34
36.9
12gcm
38.8
39.8
OFF
T-BRAKE
−0.3
3.5
80gcm
13.8
10gcm
15.5
40gcm
17.9
18.9
23.8
26.5
28
OFF
28.9
10gcm
31.1
32.8
80gcm
34
37
38.1
OFF
39
10gcm
U/D LEVER
31
33

Fig. 15-14 Mecha Timing Chart

(1) There are two STOP modes and two FF/REW modes.

1) STOP 1
   This mode is performed when PB and FF/REW is not done for 5 miniute at power on.
   The small load is given to S REEL DISC and T REEL DISC. And the cylinder motor is stopped.

2) STOP 2
   This mode is performed when you press the stop button as performing FF/REW.
   The large load is given to S REEL DISC and T REEL DISC.

3) FF/REW 1
   This mode is performed when
   ❶ The tape load is small during performing FF and reducing speed.
   ❷ The tape load is large during performing REW.
   The small load is given to S REEL DISK and no load is given to T REEL DISC.

4) FF/REW 2
   This mode is performed when
   ❶ The tape load is large during performing FF.
   ❷ The tape load is small during performing REW and reducing speed
   No load is given to S REEL DISK and the small load is given to T REEL DISK.

(Cf) According to acceleration, deceleration, and the location of tape, tension control which is caused by converting FF/REW 1 and FF/REW 2 each other is performed during FF or REW.

(2) The condition of S Brake and T Brake at each mode.

< S BRAKE>

1) OFF BRAKE (Unloading completion, RPS, PLAY, FF/REW 2)
   - S BRAKE is detached from S REEL DISC completely. So S REEL DISC is free.

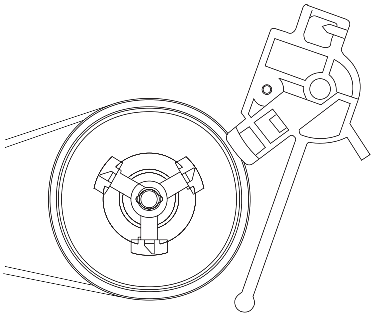


Fig. 15-15

2) SOFT BRAKE(during LOADING, STOP 1, FF/REW 1)
   - The small load is given to S REEL DISC.

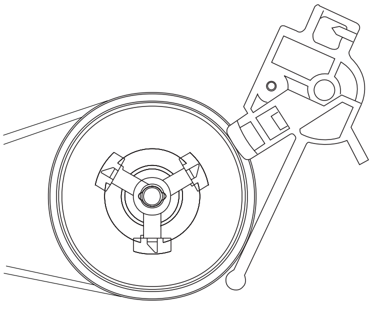


Fig. 15-16

3) MAIN BRAKE (STOP 2)
- The large load is given to S REEL DISC.

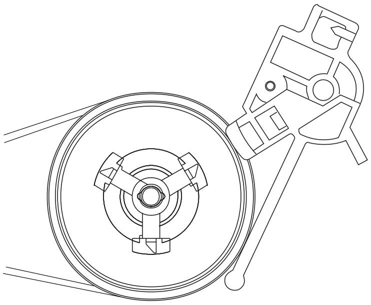


Fig. 15-17

< T BRAKE>

1) OFF BRAKE (PLAY, FF/REW 1)
- T BRAKE is detached from T REEL DISC completely. So T REEL DISC is free.

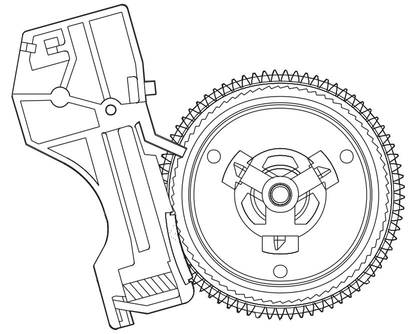


Fig. 15-18

2) SOFT BRAKE (UNLOADING Completion ,STOP 1, FF/REW 2)
- The small load is given to T REEL DISC.

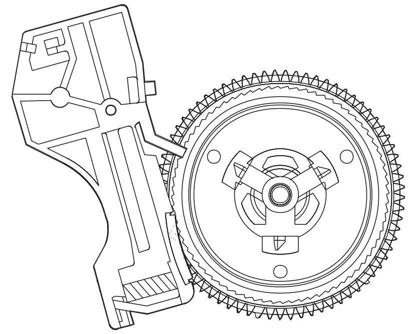


Fig. 15-19

3) REVERSE SEARCH BRAKE (RPS)

- The medium load is given to T REEL DISC.

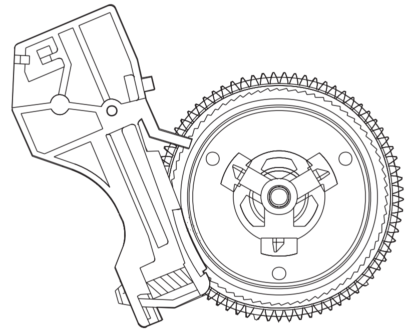


Fig. 15-20

4) MAIN BRAKE (on the loading, STOP 2)

- The large load is given to T REEL

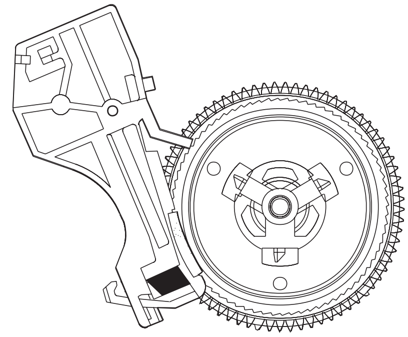


Fig. 15-21

15-6-2 Mode Sensor Drive

The mode sensor converts each mode of the mechanism into an electrical signal and transmits it to the microcomputer. The FL cam gear is rotated by the loading motor, and the cam slider slides after operation of the cassette holder.
Then the mode switch also rotates synchronized with the cam slider and outputs a signal corresponding to each mode. This signal is transmitted to the microcomputer and the microcomputer stops the cam slider at a specified angle, thus establishing each mode.
The IC601 controls Capstan Motor Drive IC for each mode to make the loading motor rotate in forward or reverse direction, thereby setting the mechanism at a specified position.
The mode switch develops three outputs A, B and C.
The circuit configuration of the mode sensor drive is shown in Fig. 15-22.

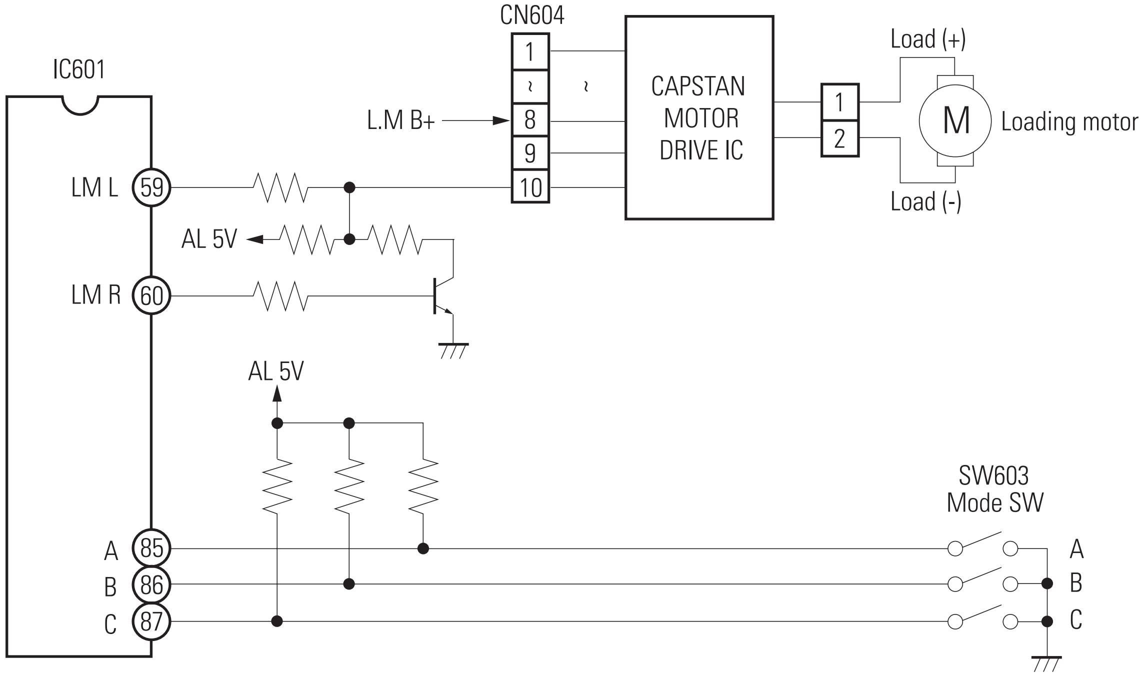

CN604
1
~
8
9
10
IC601
L.M B+
CAPSTAN MOTOR DRIVE IC
1
2
M
Load (+)
Loading motor
Load (-)
LM L
59
AL 5V
LM R
60
AL 5V
SW603
Mode SW
A
85
B
86
C
87
A
B
C

Fig. 15-22 Mode Sensor Drive

15-6-3 Operations in Each Mode

[1] Cassette loading & Tape loading mode

<Cassette loading>

(1) The FL cam gear is in the Cassette unloading (position I)position, and the cassette holder is in the out status (start sensor ON). Under this condition, each motor is stopped.

(2) Status of the mechanism is as follows.
  1) S.T guide rollers, tension post, No.9 guide are in unloading status and housed in the reel disc side.
  2) S brake is released and T brake is in soft brake status.
  3) The clutch holder assembly is in clutched status and idle lever assembly is enabled to be engaged with both S and T reel discs.

(3) When a cassette is inserted, the lock lever of cassette holder is released from the stopper, the cassette holder moves, the FL arm lever rotates, and the FL Drive Slider slides, thereby closing the start sensor.

(4) IC601 controls Capstan Motor Drive IC to rotate the loading motor in forward direction, and move the cassette holder. At the same time, the capstan motor rotates in the reverse direction and moves the cassette down (vertical motion) while rotating the S reel disc.

(5) The cassette lid opens when the vertical motion starts.

(6) When the vertical motion has completed and the cassette is mounted, the capstan motor rotates in the reverse direction. At that time the position “a” is detected with the cam slider shifted and the loading/capstan motors are stopped. After 300msec the loading motor rotates in the forward direction and enters the tape loading operation.

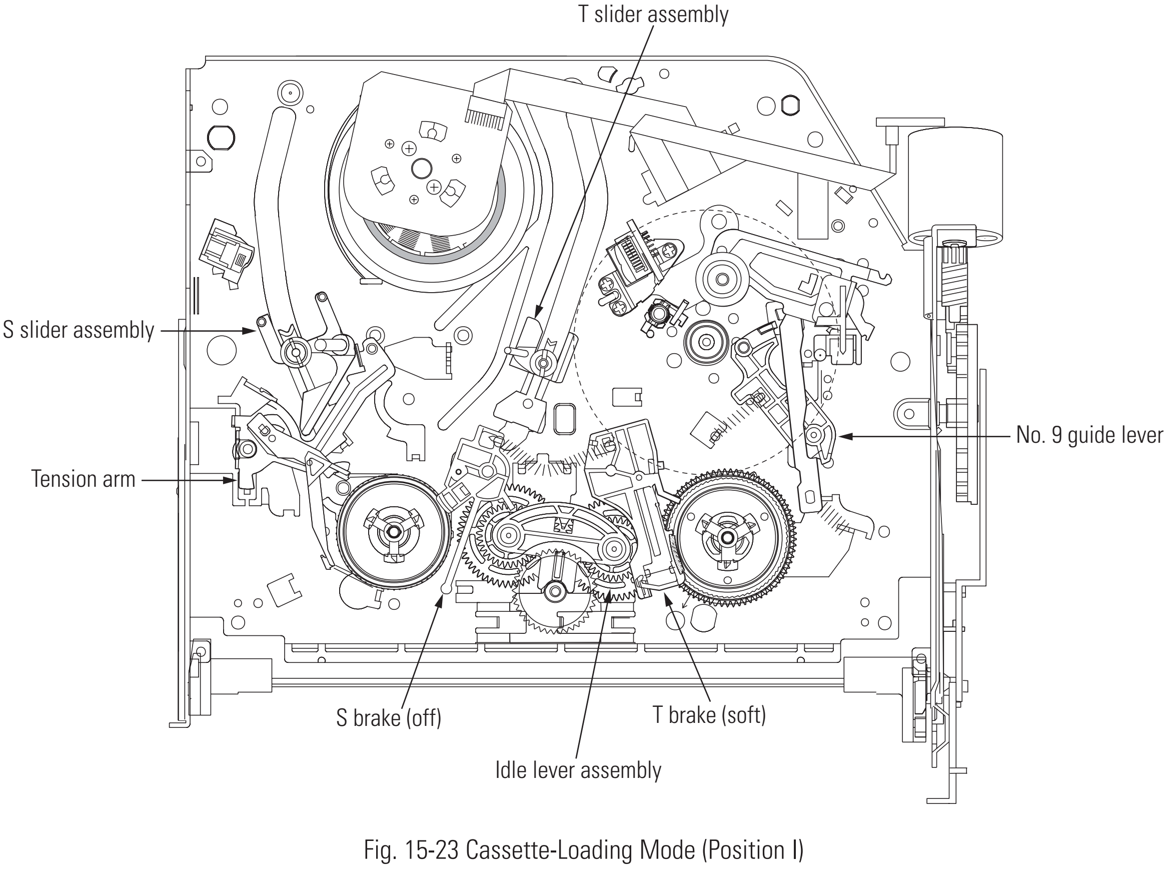


Fig. 15-23 Cassette-Loading Mode (Position I)

<Tape loading>

(1) After slot-in operation (cassette loading), FL cam gear rotates and the cam slider starts shifting, and a loading gear is ready to start.
Under this condition, the mechanism status is as follows :
1) The T main brake actuates so that tape does not com out from the T reel during the loading operation.

(2) The cylinder starts to rotates after the loading motor is rotated.

(3) When the cam slider reaches the position II (loading/unloading modes), the mechanism enters the loading status and operates as described below.
1) S,T sliders are moved through the loading drive gear and trun on the tension post.
2) The No. 9 guide is loaded.
3) The pinch roller is loaded up to front of the capstan.
4) The head cleaner is actuated during loading operation.
5) The S soft brake is actuated.

(4) When the cam slider passes through the position III, and detects the position IV (playback standby mode), the loading motor stops. Under this condition, the mechanism status is described as below :
❶ The pinch roller is pressed to the capstan.
❷ The No.9 guide is stored in the cassette.
❸ The tension post touches the tape, band brake force is applied, and the tension servo brake mechanism actuates.
❹ Brakes for the reel discs are all off.

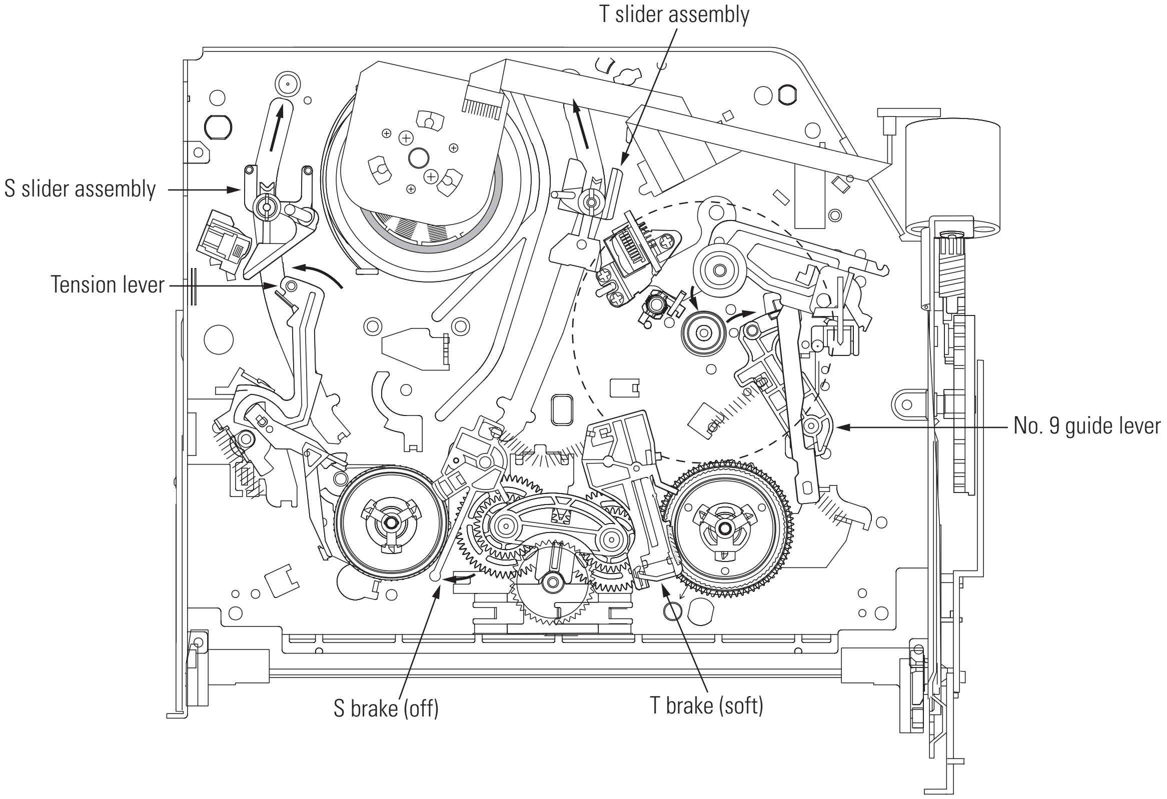


Fig. 15-24 Tape Loading Operation (Position II)

<Playback Stand-by (Stop) mode>

(1) The tape loading operation completes and the loading motor stops.
(2) In the same way as in the playback mode, the capstan motor rotates in forward direction and the T reel disc takes up the tape. (For more details, refer to the playback mode.)
(3) After running the tape for 0.6s, the mechanism rotates the capstan in the reverse direction for 0.3s to slack the tape properly with pinch roller pressed.
(4) If nothing is operated for about 5 minutes, the loading motor rotates in the forward direction and the cam position reaches the position V, and both the loading motor and the cylinder motor stop.
(5) During this period, the video and audio systems are in the same status as in the stop mode.

[2] Tape unloading & Cassette unloading

<Tape Unloading>

(1) When the [EJECT] button is pressed in the stop mode, the mechanism enters the eject mode.
(2) IC601 controls cylinder motor drive IC to make the cylinder motor rotates.
(3) IC601 makes the loading motor rotate in the reverse direction, and shifts the cam slider.
    1) The mechanism components move in the reverse direction against the loading operation.
(4) When the cam slider reaches the position II, IC601 makes the capstan motor rotate in the reverse direction (LP X11) and takes up the tape at a specified torque using the clutch mechanism.
(5) When the cam slider reaches the position I, it brakes the capstan motor to stop, and then stops the loading motor after 230ms passed.

<Cassette unloading>

(1) Furthermore, IC601 makes the loading motor rotate in the reverse direction and also the capstan motor in reverse direction, applies braking force to the capstan motor by detecting the tape start sensor OFF --> ON, and the capstan motor stops.
(2) IC601 makes the loading motor stop after 150ms passed from sensing “ON”.
(3) Also IC601 makes the loading motor rotate in the forward direction after 120ms passed.

[3] Stop mode

(1) The cam slider is in the stop mode (position V) and each motor stops.
(2) The mechanism status is as follows :
  1) The S, T guide rollers are in the loading status.
  2) The pinch roller is kept away from the capstan.
  3) The tension post is shifted to the reel disc side. That is, the band brake is released from the ON status and the back tension is also released.
  4) The S, T soft brakes are being applied.

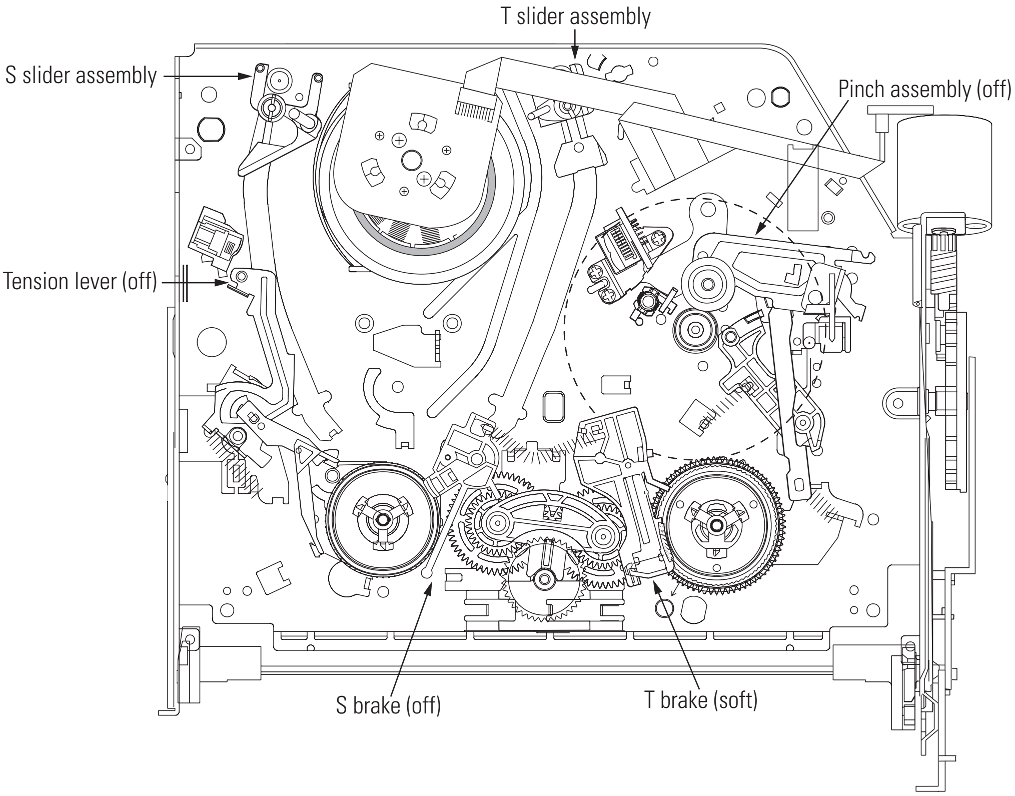

T slider assembly
S slider assembly
Pinch assembly (off)
Tension lever (off)
S brake (off)
T brake (soft)

Fig. 15-25 Stop Mode (Position V)

[4] FF/REW mode

(1) When the [REW] button is pressed in playback standby mode, the mode enters the FF/REW mode.
(2) IC601 controls Capstan Motor Drive IC and makes the loading motor rotate in the forward direction.
The loading motor stops when the cam position reaches the position VI, VII (FF/REW mode).
The mechanism status is as follows :
1) The pinch roller is OFF.
2) The No. 9 guide is once loaded but immediately returned.
3) The tension post is moved to the reel disc side. That is, the band brake is released from the ON status and the back tension is released.
4) The clutch holder assembly is in the direct status and the capstan driving force is directly transmitted to the reel disc.
5) Brakes for the reel discs are as follows :
❶ VI position FF/REW 1 mode (S Brake : soft brake, T Brake : off)
❷ VII position FF/REW 2 mode (S Brake : off, T Brake : soft brake)
(3) IC601 makes the capstan motor rotate in the forward direction and the idle gear transmits the rotation to the S/T reel discs to take up the tape.

[5] FF/REW to STOP mode

(1) When the [STOP] button is pressed in the REW mode, the mechanism enters the playback standby mode.
(2) IC601 makes the loading motor rotate in the reverse direction and stops at the position V.
With this mode shift, the mechanism actuates S, T main brakes to stop the tape. Then, the capstan motor also stops by braking force 70ms after detecting “e” position.
(3) IC601 makes the loading motor rotate in the reverse direction again and stops the loading motor when the cam slider reaches the position IV (playback mode), thus setting the playback standby mode.

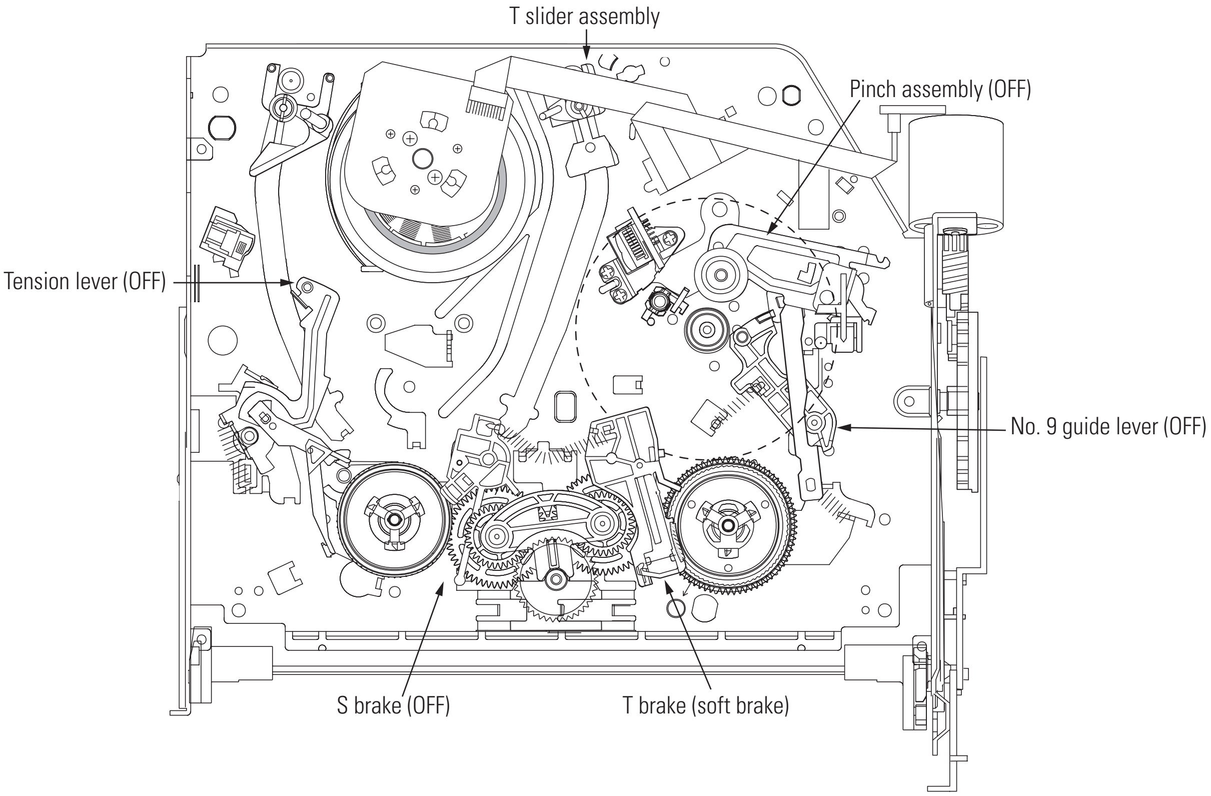


Fig. 15-26 FF/REW 2 Mode (Position VII)

[Playback mode]

(1) When the [PLAY] button is pressed in the stop mode, the mechanism enters the playback mode.
(2) IC601 controls cylinder motor drive IC and rotates the cylinder motor.
(3) IC601 controls Capstan Motor Drive IC to rotate the loading motor in the reverse direction and stops the motor when the cam slider reaches the position IV (playback mode). (When operating from the playback standby mode, the cam slider has been already on the position IV.) The mechanism works as follows :
  1) The pinch roller moves toward the capstan side and press fits the capstan.
  2) The No.9 guide is loaded once and then returned immediately.
  3) The tension post touches the tape, the band braking force is applied, and the tension servo mechanism works.
  4) The clutch holder assembly enters clutched condition.
  5) S,T brakes are released.
(4) IC601 makes the capstan rotate in the forward direction and feeds the tape. The idle gear transmits the rotation to the T reel disc and the reel disc takes up the tape at a constant torque by the clutch mechanism.
(5) IC601 controls the video circuit and switches the playback screen.
(6) The recording speed data identified by IC601 is displayed in the Led module.

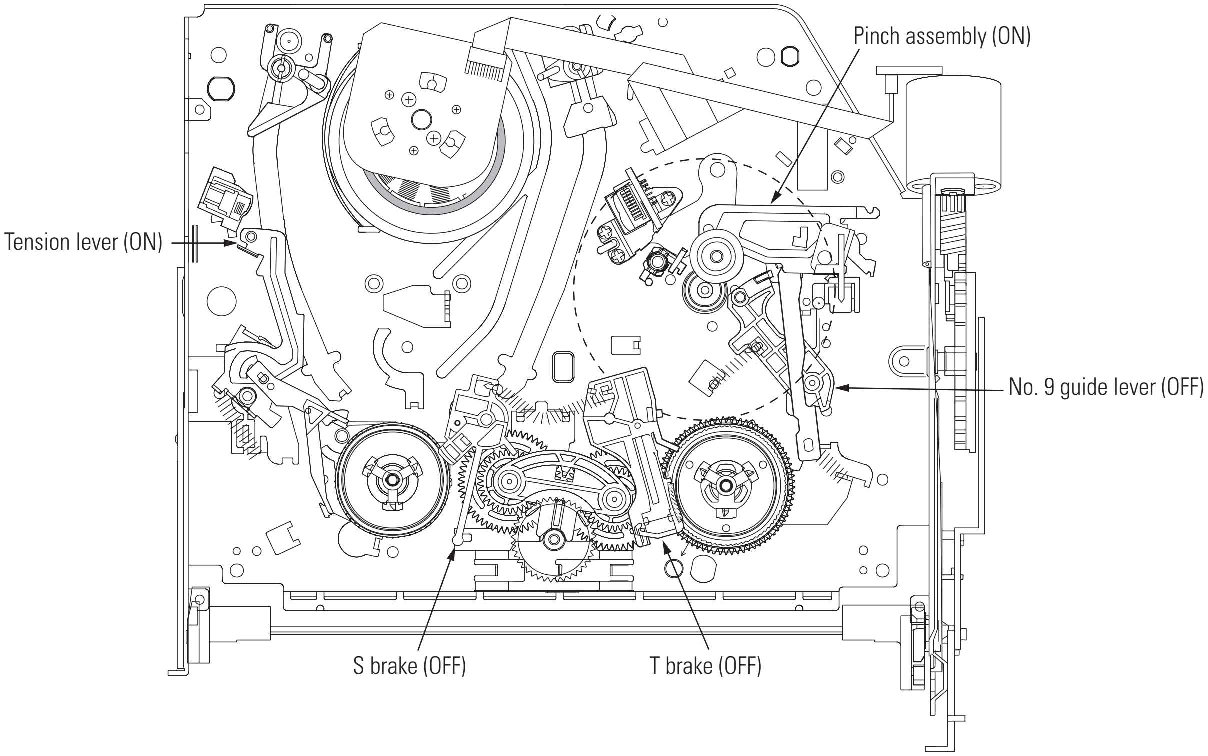


Fig. 15-27 Playback Mode (Position IV)

<Still mode>

(1) When the [PAUSE] button is pressed in the playback mode, the mechanism enters the still mode. The cam slider is in the position IV (playback mode), the cylinder motor is rotating, and the capstan motor is rotating in the forward direction.
(2) IC 601 controls the audio circuit and actuates the audio mute function.
(3) The capstan motor enters the intermittent operation mode and then stops.
(4) IC 601 maintains the recording speed data just before the still operation.
(5) In the slow mode, the capstan motor rotates continuously in the intermittent driving.

<FPS mode>

(1) When the [FF] button is pressed in the playback mode, the mechanism enters the FPS mode (forward picture search). The cam slider is in the position IV (playback mode), the cylinder motor is rotating, and the capstan motor is rotating in the forward direction.
(2) IC 601 controls the audio circuit to actuate the audio mute operation.
(3) IC601 makes the capstan rotate at 7 times for SP, 21 times for SLP to feed the tape, respectively. The tape is taken up at a constant torque by the clutch mechanism. (The mechanical operation is the same as that in the playback mode.)
(4) The recording speed data identified by IC601 is displayed on the Led module.

<RPS mode>

(1) When the [REW] button is pressed in the playback mode, the mechanism enters the RPS mode.
The cam slider is in the position IV (playback mode), the cylinder motor is rotating, and the capstan motor is rotating in the forward direction.
(2) IC601 controls the audio circuit to actuate the audio mute operation.
(3) IC601 controls Capstan Motor Drive IC to make the loading motor rotate in the reverse direction.
After 180ms the loading motor stops for 250ms. During the mode shift operation, the mechanism rotates the capstan motor in the forward direction for a constant time so that the tape is not slackened.
(4) When the cam slider reaches the position “c” (loading motor stoped for 250ms), the capstan motor is rotated in the reverse direction for a constant time, and the idle gear is swung toward the S reel disc side.
Then, the loading motor rotates in reverse direction and shifts to the position III (RPS mode).
When the cam slider reaches the position III (RPS mode), the loading motor stops.
The mechanism status is as follows :
1) The No.9 guide is loaded.
2) The tension post is separated from the tape.
3) The T soft brake is turned on.
The cpastan motor rotates in the reverse direction at 7 times for SP, 21 times for SLP to feed the tape in the REW direction, respectively. At the same time, the idle gear transmits the rotation to the S reel disc and the S reel disc takes up the tape by the clutch mechanism.
(5) The recording speed data identified by IC601 is displayed on the Led module.

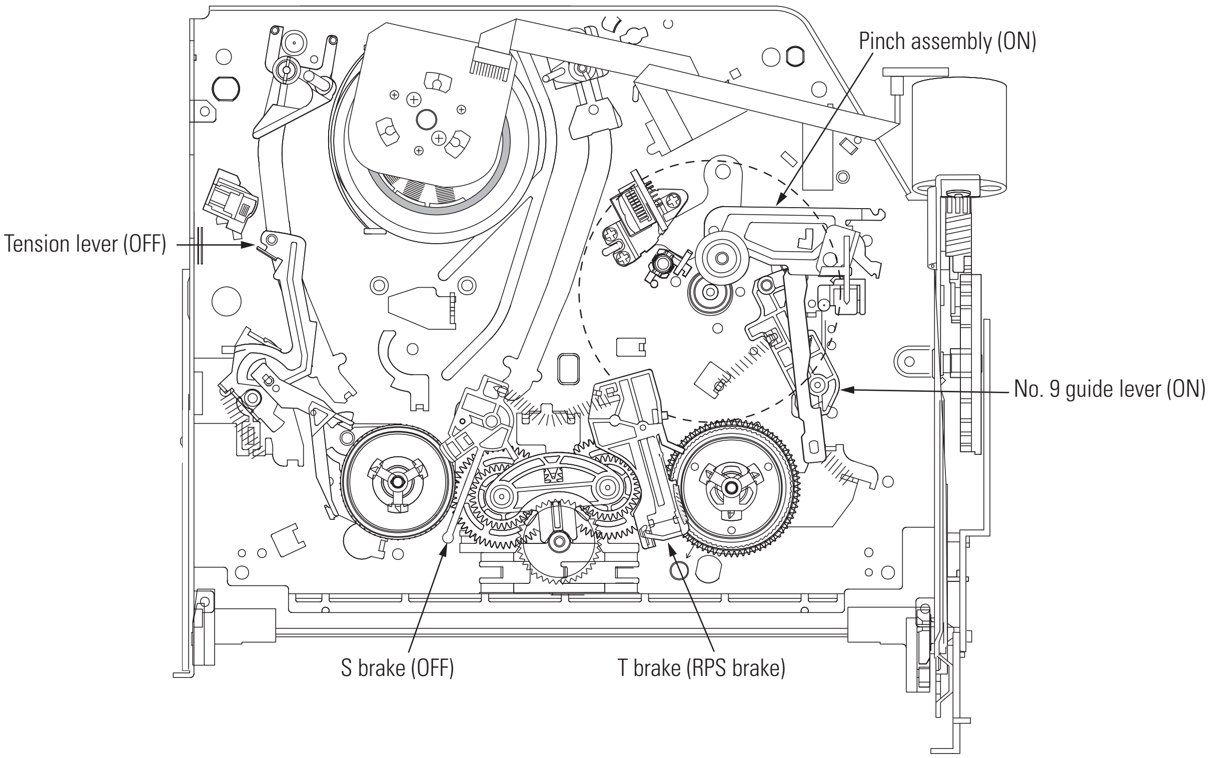


Fig. 15-28 RPS Mode (Position III)

[7] REC mode

<REC mode>

(1) When the [REC] button is pressed in the stop mode, the mechanism enters the REC mode.
(2) The cylinder motor starts and then the loading motor rotates in reverse direction.
The cam slider reaches the position IV (playback mode).
The tape is taken up at a constant torque. The mechanism operations are the same as those in the playback.
(3) IC601 controls the audio circuit and video circuit to set the record enable mode.
(4) Recording mute is released, thus setting the recording status. The CTL signal is output for recording.

<REC PAUSE mode>

(1) When [PAUSE] button is pressed in the REC mode, the mechanism enters the REC pause mode.
(2) IC601 controls the audio circuit and the video circuit, and releases the record enable mode and performs the rewinding for synchronous editing.
(3) After completion of the rewinding for synchronous editing, the cam slider is in the position IV (playback mode), the cylinder motor is rotating, and the capstan motor and the loading motor stop.

15-7 Introduction to DVD

15-7-1 The Definition of DVD

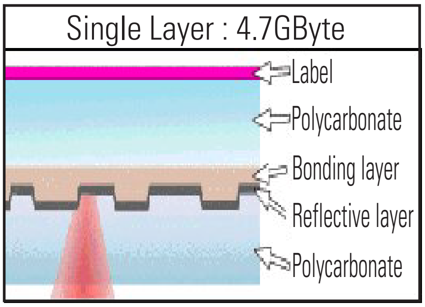
DVD is the next generation medium and is the acronym of the Digital Versatile Disc or thr Digital Video Disc, which maximizes the saving density of the disk surface using the MPEG-2 compression technology to enable the storage of 17G bytes of data on the same size CD.

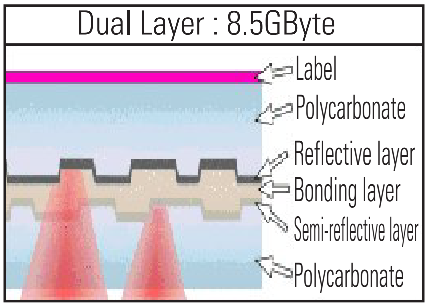
1) 7 times the storage capacity of the conventional CD
- Minimized the track pitch and pit size to 1/2 of conventional CD.
- Uses red laser with short-wavelenght of 650nm (635nm).

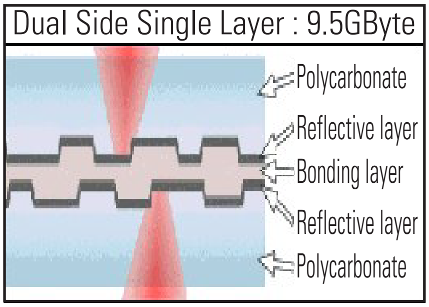
- **DVD Vs. CD-ROM**

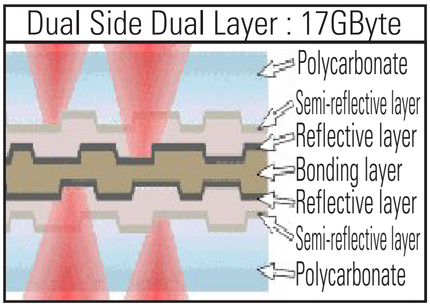
	CD-ROM	CD-R/RW	DVD-ROM	DVD-R/RW	DVD-RAM
Disc Thickness	1.2mm	1.2mm	0.6*2mm	0.6*2mm	0.6*2mm
Lens NA	0.45	0.45(0.5)	0.6	0.6	0.6
Laser wavelenght	780um	780um	650um	650um	650um
Track pitch	1.6pm	1.6pm	0.74pm	0.74pm	0.615pm
Capacity	0.65GB	0.65GB	4.7GB	4.7GB	4.7GB
Track structure	Pit train	Groove	Pit train	Groove	Land/Groove

2) Disc Formats
DVD consists of two 0.6mm discs attached together, enabling access to the upper and lower side of the disk, and 4 sides could be used at maximum.


Single Layer : 4.7GByte
Label
Polycarbonate
Bonding layer
Reflective layer
Polycarbonate


Dual Layer : 8.5GByte
Label
Polycarbonate
Reflective layer
Bonding layer
Semi-reflective layer
Polycarbonate


Dual Side Single Layer : 9.5GByte
Polycarbonate
Reflective layer
Bonding layer
Reflective layer
Polycarbonate


Dual Side Dual Layer : 17GByte
Polycarbonate
Semi-reflective layer
Reflective layer
Bonding layer
Reflective layer
Semi-reflective layer
Polycarbonate

15-7-2 DVD Types

FORMAT	TYPE	APPLICATIONS
DVD-Video	Playback Only	High quality image and sound for movies and other video media.
DVD-ROM	Read Only	Multi-functional, multi-media software that requires large storage capacity.
DVD-Audio	Playback Only	High quality sound that exceeds the CD, multi-channel Audio.
DVD-R	1 Time Recording	As with CD-R, write only once
DVD-RAM	Rewritable (more than 100,000times)	This can be virtually used as hard-disk, with a random read-write access
DVD-RW	Rewritable (About 1000times)	Similar to DVD-RAM except than its technology features a separated read-write access more like phonograph than a hard disk.

15-8 DVD-Video Fromat

15-8-1 Main Features

1) Able to store up to 160 minutes of Movie by utilizing the MPEG-2 compression technology. (Aver. 133min.)

2) Enables more than 500 lines of horizontal resolution. (Class corresponding to the Master Tapes used in broadcasting stations)

3) Provides Dolby Digital 5.1ch Surround 3D sound, which enables theater quality sound (NTSC area).
- For PAL areas, 1 of either MPEG-2 Audio or Dolby Digital must be selected.

4) Multi-Language
- Able to store up to 8 languages of dubbing.
- Able to store up to 32 subtitle languages.

5) Multi-Aspect Ratio
3TV Mode alternatives ; 16:9 Wide Screen (DVD Basic)/4:3 Pan & Scan/Letter Box.

6) Multi-Story
Possible to implement Interactive Viewing which enables the user to select the scenario.

7) Multi-Angle
Able to view the camera angle you selected among the scenes recorded with multiple camera angles.

Note ; The above media features must have the DVD Title that contains the appropriate contents to function properly.

15-8-2 Audio & Video Specifications

Classification		DVD-Video		Video-CD	LD
VIDEO	Compression	MPEG-2		MPEG-1	Analog
	Pixel	720 x 480		352 x 240	
	Horizontal resolution	Max. 500 Lines		Max. 250 Lines	Max.420 Lines
	Compression rate	1/40		1/140	Analog
	Transmission speed	Max. 9.8Mbps (variable)		1.15Mbps (fixed)	
	TV aspect	16:9 / 4:3		4:3	4:3
AUDIO	Audio	Max. 8 streams		2CH stereo	2 Analog CH. 2 Digital CH. (16Bit/44.1KHz) or 1 Analog CH. 1 Stream of Dolby Digital 2 Digital CH. (16Bit/44.1KHz)
	Recording type	Dolby Digital	Linear PCM	MPEG-1 Layer 2	
	Transmission rate	448Kbps/stream	6.144Mbps/stream	224Kbps	
	Channel	5.1CH/stream	8CH/stream	2CH	
	Sampling frequency	48KHz	16, 20, 24Bit/48, 96KHz	16Bit/44.1KHz	

15-8-3 Detailed Feature

DVD-Video Feature 1

When Developing the DVD Software, various addition and modification is possible.

As the storage capacity increases, the DVD-Video separates the main data and the additional data such as the Multi-Function into different data areas, enabling the control of time-data ratio to provide the format that enables the flexible Software development

- 1 Movie (3.5Mbps)
  + Subtitle (1 Language)
  + Surround Audio (1 Language)
  = 160min storage (4.673Gbytes)

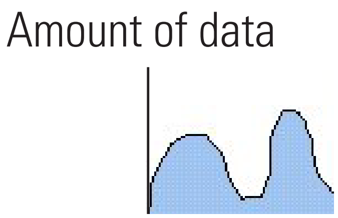
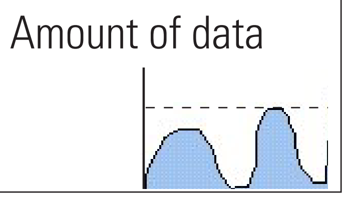
- 1 Movie (3.5Mbps)
  + Subtitle (4 Language)
  + Surround Audio (4 Language)
  = 160min storage (4.680Gbytes)

- 1 Music Video (4Mbps)
  + 2ch High quality Audio (96kHz/24bit)
  = 72min storage (4.648Gbytes)

DVD-Video Feature 2

Application of the MPEG-2 compression technology.

DVD-Video uses the variable compresion technology, the MPEG-2 to compress the moving image optimally, minimizing the Data loss to Provide a clear, natural screen while increasing the storage time.

DVD-Video	• MPEG-2 (Variable compression : Max. 1/40) - Field unit compression. - Compression rate change according to the amount of Data. - Differentiates the still image and the moving image compression rate, reducing Data loss and enables efficient compression.	
Video-CD	• MPEG-1 (Fixed compression : Max. 1/140) - Frame unit compression. - Compresses all data using the same ratio. • Fast movements are jagged, and unnatural	

DVD-Video Feature 3

High quality surround audio.

DVD-Video can store the audio using the 5.1ch Dolby Digital compression or the advanced Liner PCM method, providing the better-than-CD quality and theater like audio quality.

- DTS (Digital Theater System)
  Home theatre and music playback in the home, DTS provides high quality 5.1-channel surround sound with many extras not offered by other consumer formats. As well as handling DTS-branded releases from a growing number of music labels and consumer software producers, DTS provides enhanced 6.1 matrix and DTS 6.1 discrete decoding that envelopes the listener in sound. DTS technology is featured in a wide cross section of receiver/pre-amplifiers, DVD players and and add-on components from leading consumer audio vendors

- Dolby Digital (AC-3)
  - Unlike the traditional Dolby pro-Logic method, the Dolby Digital method separates all 5 main channels (Front L/R, Center, Surround (Rear) L/R)and the Sub woofer to provide live surround audio.
  - Using the Down Mix method, the conventional Dolby Pro-Logic and Stereo are all compatible.
  - Each separated channels are played back at CD quality sound. (Frequency band: 20Hz ~ 20KHz)

- Linear PCM (Pulse Code Modulation)
  - Provides the high quality Digital sound without the audio data compression.
  - Various Digital Recordings are possible as shown in the table to the right.

Sampling Frequency	Bit Rate
48KHz	16bit
	20bit
	24bit
96KHz	16bit
	20bit
	24bit

- Dolby Digital compatible Audio Mode

Audio Coding Mode	Channel Format					Remark
		Front		Surround (Rear)		
	L	C	R	L	R	
1/0		0				Mono
2/0	0		0			Stereo
3/0	0	0	0			Surround
2/1	0		0	Mono		
3/1	0	0	0	Mono		
2/2	0		0	0	0	
3/2	0	0	0	0	0	

DVD-Video Feature 4

Multi-Language

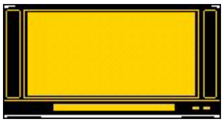
- Audio Dubbing - Max. 8 Languages
- Subtitle - Max. 32 Languages. Capable of storing, and selectiong.
- Linear PCM (Pulse Code Modulation)

DVD-Video Feature 5

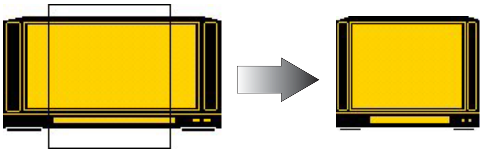
Multi-Aspect

- Unlike the conventional VCD or LD, DVD-Video has the default of 16:9 Wide, and can be viewed using the conventional 4:3 TV, enabling the expansion of viewer selection capabilities.

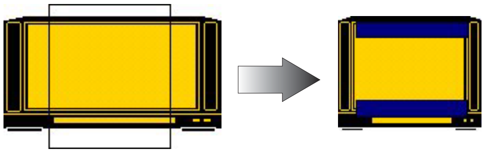
  - 16 : 9 TV : Wide Mode (16:9 Wide Full Screen)
  - 4 : 3 TV : Letter Box Mode, Pan & Scan Mode



16:9 Wide



4:3 Pan & Scan



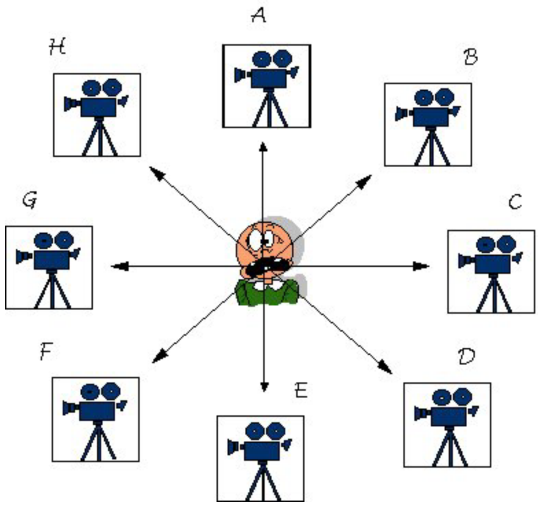
4:3 Letter Box

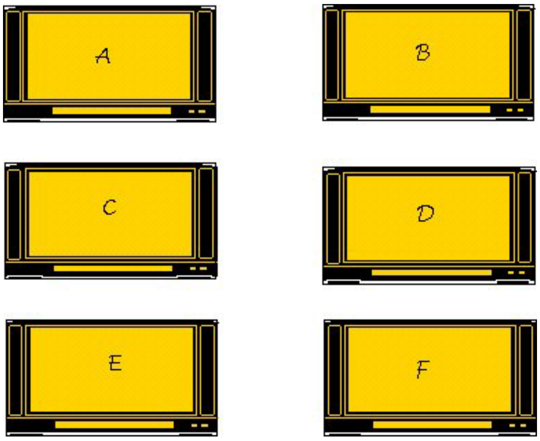
Note ; This function is disc-dependent, may not work on all DVDs.

DVD-Video Feature 6

Multi-Angle

- Up to 9 angles of view may be stored, enabling the viewer to select a specific viewpoint at a given time.
  --> Especially, for the Music Video and Sports Title, this provides a more lively image of the scene.





Note ; This function is disc-dependent, may not work on all DVDs.

DVD-Video Feature 7

Multi-Story

- DVD-Video provides the enviroment suitable for the bi-directional Software develoment, providing multiple scenarios. This feature enables the Multi-Story function.

OPTION

Parental Lock

- For the titles that are not suitable for children viewing, Parental Locks are set, requesting user defined passwords for viewing
- Parential Locks may be set on specific frames of the Title, enabling the player to skip those frames during playback.

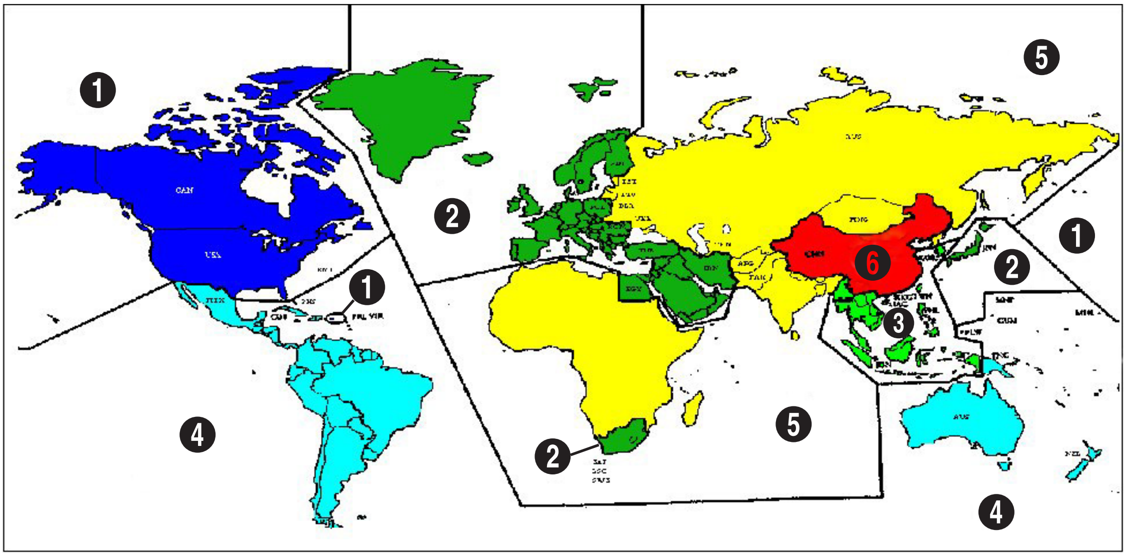
COPYRIGHT

Regional Code & Macrovision

- Classify the world into 6 regions, and if the DVD Title and the Player's "Reginal Code" do not agree, playback is prohibited.

- **Regionnal Coding is optional for the Soft developers (Region 0 All Code), but the Hardware developers must adopt the appropriate regionnal code for sale.**

  - Region 1 : The United States and its territories, Canada.
  - Region 2 : Europe, Japan, Greenland, Egypt, South Africa, the Middle East.
  - Region 3 : Taiwan, Hongkong, Korea, South East Asia.
  - Region 4 : Mexico, South America, Australia, New Zealand.
  - Region 5 : Russia, Eastern Europe, India, Africa.
  - Region 6 : China.
  - Region 0 : Worldwide (All Code)



- Adoptation of the Macrovision System disables the copying on to other media.

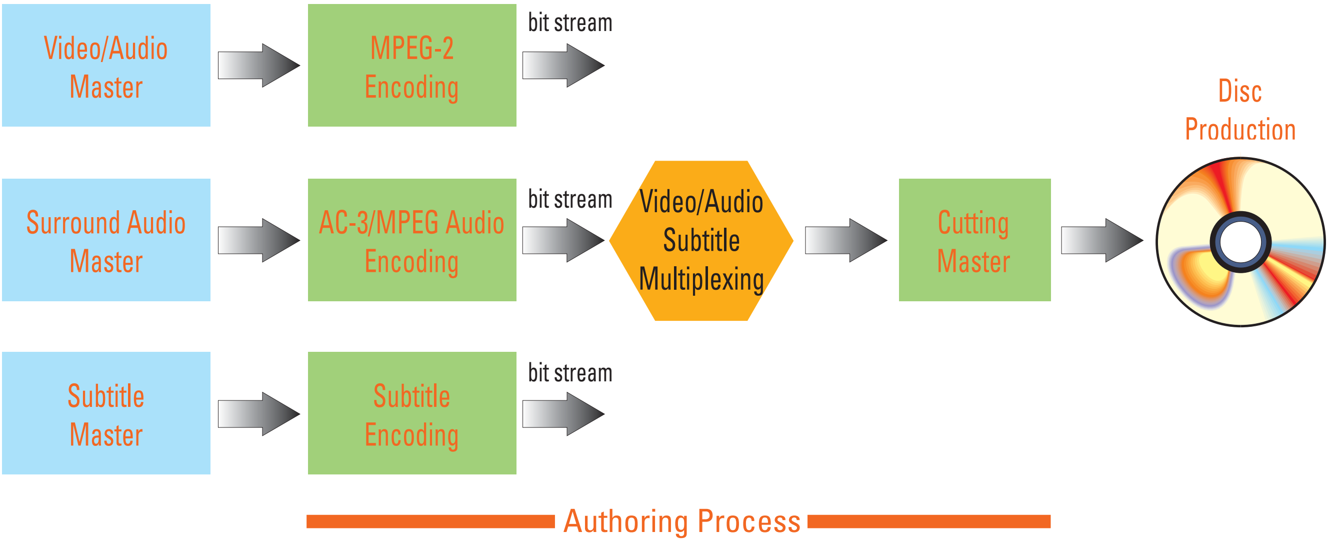
Remark

DVD-Video Authoring Process

- The image quality of the DVD-Video may vary accoring to the quality of the Master and the Authoring Process

  - The image quality of the DVD-Video varies according to the Digital Mastering Source such as the conventional LD, VCD, or Original Film.
  - Different Authoring Process are used accoring to the Software developers, and this may affect the DVD image quality.

- **Authoring Process**


Video/Audio Master
MPEG-2 Encoding
bit stream
Surround Audio Master
AC-3/MPEG Audio Encoding
bit stream
Subtitle Master
Subtitle Encoding
bit stream
Video/Audio Subtitle Multiplexing
Cutting Master
Disc Production
Authoring Process

15-9 About IEEE-1394

15-9-1 Comparison between IEEE-1394 and other digital interfaces

Since there are many different interfaces available, for example, RS422, RS644, and USB, vision system integrators are very likely to be confused when choosing the right interface for their application. For the ideal design of a vision system, it is vital to have the right bus/interface. To make things even more complex, there is no easy answer such as IEEE-1394 is the best choice.
Furthermore, the new CameraLink standard, promoted by companies such as Pulnix, Basler AG, and many frame grabber companies, seems to be the state of the art interface. So why should IEEE-1394 be an alternative?

These questions are as complex as mostvision applications and there is no simple guideline .
Each of these interfaces offers many benefits and each of them has its individual drawbacks and restrictions. In the table below, we try to give a brief comparison of the most popular interface systems.

	RS 644 [1]	CameraLink	IEEE-1394	USB 2
Topology	Link	Link	Bus	Bus
Windows Driver	Proprietary	Proprietary	Native (Win 200, Win 98)	Native (Win 200, Win 98)
“Guaranteed” Bandwidth	~20 to 40 MByte/s	~255 MBytes/s	~32 MBytes/s[2]	~38 MBytes/s[2]
Cable Length	~10 m @ 40MHz ~20 m @ 200MHz	~10 meters	4.5 meters	5 meters
Wires Needed for 8 Data Bits	22[3]	10	4	2
Parameter Port	No	≥ 1 KByte/s	~8 MBytes/s [2]	~9 MBytes/s [2]

[1] These specs are for a typical 8-bit camera application operating at 20 MHz or at 40 MHz.

[2] 80% of the bus bandwidth is used for image data and 20% is used for parameter data.

[3] 16 wires are used for data bit transfer and two wires each are used for the separate Line Valid, Frame Valid, and Pixel Clock signals required with RS-644 transmission.

A careful comparison of the specifications shown in the table should be your first selection guide for the interface. For example, for an integrator who needs very high speed, USB 2 and IEEE-1394 are not the first choice. On the other hand, these buses are the ones to select in cases
where multiple cameras are needed or cost is a critical issue. Also, the user needs to be aware
that the D-Cam specification currently does not specifically support Line Scan cameras.
However, the specification is open and line scan support could be achieved via Format 7. As
for USB 2, it is still in its infancy in machine vision and we are not aware of any kind of machine vision support.

15-9-2 Fiexibility and Cost Reduction

Many image processing application engineers face a familiar group of problems when designing and building a system. The end user requires system flexibility, simple adaptation, fast delivery times, and most importantly a reasonable price. With conventional systems, whether analogor digital, engineers must confine themselves to certain combinations of the existing cameras, frame grabbers, and software. The product choice for this system configuration is limited. Unless the decision is made to use a high cost frame grabber that supports multiple cameras, sometimes known as multi-norm , it is usually not possible to operate cameras with different resolutions from the same frame grabber.

For many applications, the introduction of digital cameras is hindered by the cost specified by the end customer, however technically effective digital cameras may be. With the increased use of IEEE-1394 in the industrial image processing business, many of these problems are solvable in a sure , safe , and cost effective way.

1) Hardware Cost Example

This example compares two similar vision systems. Each system uses four Megapixel resolution digital cameras . The traditional solution consists of one frame grabber per camera, one parallel digital data cable per camera, and one power supply per camera.

The 1394 solution requires one hub and one interface card to connect the four cameras , along with five inexpensive 1394 cables. The 1394 cables carry power to the cameras directly from the computers internal power supply. (Note that not all computers are capable of supplying enough power for the cameras. In some cases a separate power supply may be required.)

Traditional Solution with multiple frame grabbers	Price	1394 Solution	Price
Four Cameras	18,000	Four 1394 Cameras	18,000
Four Frame Grabbers	4,400	One 1394 Interface Card	100
Four Cable	400	One 1394 Hub	120
Four power Supplies	320	Five Cables	150
Total	$23,120	Total	$18,370

15-9-3 Application Examples

Today, there are already applications realizing the benefits of IEEE-1394 technology. For example, at one of our customer sites, Basler was faced with a vision system which has the following specifications:
The machine is a high-speed assembly system . Two independent robots take different parts (different in size, shape, and reflection) from a support unit and mount these parts on a mounting plate. Timing is crucial, and in the worst case, a part must be taken from the tray every 100 ms. Accuracy of parts mounting is also critical (0.5 mm) . To have a vision system inspecting these operations , 4 cameras (2 on each of the robots) are needed:

- 2 low resolution Basler A302f cameras (640 x 480) for checking if the mounting plate is in place
- 2 high-resolution Basler A101f cameras (1300 x 1030) for checking the components to be mounted.

Since most of the parts are different, the two A101f cameras must be reconfigured before almost every image acquisition. In the worst case, the AOI, shutter, and sometimes gain need to be adjusted.

1) Solution used before Basler s Intervention

The customer used analog cameras with CCIR resolution (768 x 582) only. This drastically restricted the number of parts which could be mounted using the robots. Since these cameras had no communication port for configuration, adjusting the AOI was not possible and differences in reflection of the parts needed to be adjusted for by driving a flash circuit. All cameras were interfaced into one frame grabber (one PC).

2) Possible solution wih digial cameas using RS 644 OR Camera Link

Using RS 644 or CameraLink based cameras, the customer would need one frame grabber for each camera. It is very likely that the user would need two PCs (one for each robot). Changing the camera-configuration on the fly would require advanced grabber cards since simple grabbers are not capable of easily changing their registers for different AOIs.

3) IEEE-1394 solution

All cameras are attached to a single interface card in the PC. The Basler A302f is only used when a new mounting plate is positioned by the handler. In normal operation , only the two Basler A101f cameras will be sending data at the same time and they will be operating at about 10 FPS. This results in a data rate of about 27 MBytes/s, which is well within the specification for IEEE-1394.

Since IEEE-1394 supports bi-directional communication between the camera and the PC, before each frame capture , the PC can easily change resolution, gain , offset, shutter speed, or whatever is required.

The IEEE-1394 solution results in these clear advantages for the customer:

- Onlyone PC,

- Only one interface card (very inexpensive compared with frame grabber cards),

- Easy and inexpensive cabling ,

- The system meets the expectations for speed and accuracy,

- The range of inspectable parts is much bigger than with the old system.